

FIRE MANAGEMENT PLAN
FOR
DES LACS
NATIONAL WILDLIFE REFUGE COMPLEX

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I. INTRODUCTION

U.S. Fish and Wildlife Service policy requires that an approved Fire Management Plan must be in place for all of Service lands with burnable vegetation. Service Fire Management Plans must be consistent with firefighter and public safety, protection values, and land, natural, and cultural resource management plans, and must address public health issues. Fire Management Plans must also address all potential wildland fire occurrences and may include the full range of appropriate management responses. The responsible agency administrator must coordinate, review, and approve Fire Management Plans to ensure consistency with approved land management plans.

Service policy allows for a wildland fire management program that offers a full range of activities and functions necessary for planning, preparedness, emergency suppression operations, emergency rehabilitation, and prescribed fire operations, including non-activity fuels management to reduce risks to public safety and to restore and sustain ecosystem health. This plan fulfills this requirement and provides the guidance necessary for managing fire to achieve the resource management objectives of Des Lacs National Wildlife Refuge Complex. Furthermore, this plan will also help to achieve the management objectives as defined in the Lostwood Comprehensive Management Plan.

The importance of prescribed fire in managing upland habitats for wildlife in the northern Great Plains was presented in detail in three Environmental Assessments prepared for the Complex in 1994. The following Environmental Assessments are located within the Des Lacs NWR Complex files:

"Management of Upland Habitats on Des Lacs, Lake Zahl and Shell Lake National Wildlife Refuges";

"Management of Upland Habitats on Lostwood National Wildlife Refuge"; and
"Management of Upland Habitats on Crosby-Lostwood Wetland Management Districts".

This plan meets the requirements established by the National Environmental Protection Act (NEPA). As indicated above, an environmental assessment (EA) of the Management of Upland Habitats for each of the three areas that comprise the Complex was completed in 1994, and the determinations are attached (Appendix M). Regulations published in the Federal Register (62FR2375) January 16, 1997, categorically excludes prescribed fire when conducted in accordance with local and State ordinances and laws. Wildfire suppression and prescribed fire operations are both categorically excluded, as outlined in 516 DM2 Appendix 1. Copies of this plan will be circulated to cooperators and other interested parties.

Authority and guidance for implementing this plan are found in:

1. Protection Act of September 20, 1922 (42 Stat. 857; 16 U.S.C. 594).
2. Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66, 67; 42 U.S.C. 1856, 1845a and b).
3. National Wildlife Refuge System Administrative Act of 1966 as amended (80 Stat. 927; 16 U.S.C. 1601).
4. Federal Fire Prevention and Control Act of October 29, 1974 (88 Stat. 1535; 15 U.S.C. 2201).
5. Department of Interior Departmental Manual, Part 620 DM-1, Wildfire

- Suppression and Management (April 10, 1998).
6. United States Fish and Wildlife Service Wildland Fire Management Handbook (December 28, 2000).
 7. United States Fish and Wildlife Service Manual, 621 FW 1-3, Fire Management, (February 7, 2000).

II. COMPLIANCE WITH FWS POLICY

A. Purpose

The Des Lacs Complex consists of six administrative units including the Des Lacs National Wildlife Refuge, the Lostwood National Wildlife Refuge, Lostwood Wetland Management District, the Crosby Wetland Management District, Lake Zahl National Wildlife Refuge, and Shell Lake National Wildlife Refuge.

Des Lacs, Lostwood, Lake Zahl and Shell Lake NWRs were established for the following purposes:

" . . . as a refuge and breeding ground for migratory birds and other wildlife..."
(Des Lacs NWR-Executive Order 7154-A, August 22, 1935)
(Lostwood NWR-Executive Order 7171-A, September 4, 1935).
(Lake Zahl NWR-Executive Order 8158, June 12, 1939)
(Shell Lake NWR-Executive Order 8166, June 12, 1939)

" . . . for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (16 U.S.C. § 715d; Migratory Bird Conservation Act)

" . . . the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions . . . " (16 U.S.C. § 3901[b], 100 Stat. 3583, Emergency Wetlands Resources Act of 1986)

In 1975, the 5577-acre Lostwood Wilderness Area was established within the boundaries of the Refuge by P.L. 88-577. It was described in the Final EIS (page 14) as "A unique example of the Coteau du Missouri of the Northern Great Plains [that] would be set aside within our Nation that constitutes the last sizeable tract of this interesting formation." The area is designated as Class I air quality under the Clean Air Act. The Lostwood Wilderness Management Plan was approved in 1986 (U.S. Fish & Wildlife Service 1971).

Crosby Wetland Management District (WMD) and Lostwood WMD were established administratively as districts of land acquired through authorization and funding from Migratory Bird and Conservation Stamp Act.

The purposes for which Waterfowl Production Areas (WPAs) in the Crosby and Lostwood WMDs were established are:

To be managed:

"... as Waterfowl Production Areas" subject to "... all of the provisions of such Act [Migratory Bird Conservation Act] ... except the inviolate sanctuary provisions ..." 16 U.S.C. 718(c) (Migratory Bird Hunting and Conservation Stamp Act)

"... for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... for conservation purposes ..." 7 U.S.C. § 2002 (Consolidated Farm and Rural Development Act)

Two non-staffed refuges, Lake Zahl and Shell Lake, were established by executive order with the intent of providing rest areas for waterfowl and other migratory birds. The FWS only maintains fire suppression authority on the fee land portions of Lake Zahl NWR and Shell Lake NWR.

At present the Complex does not have an approved Master or Comprehensive Plan. Various operational plans for the Complex include objectives which pertain to fire management.

B. Objectives

The goal of wildland fire management is to plan and make decisions that help accomplish the mission of the National Wildlife Refuge System. That mission is to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. Fire management objectives (standards) are used in the planning process to guide management to determine what fire management responses and activities are necessary to achieve land management goals and objectives.

The primary goal is to provide for firefighter and public safety, property, and natural resource values. Service policy and the Wildland Fire Policy and Program Review direct an agency administrator to use the appropriate management response concept when selecting specific actions to implement protection and fire use objectives. The resulting Appropriate Management Response are specific actions taken in response to a wildland fire to implement protection and fire use objectives. With an approved Fire Management Plan, the Refuge staff may use wildland fire in accordance with local and State ordinances and laws to achieve resource management objectives (habitat improvement).

Complex goals and objectives include managing endangered species, migratory birds, public use and recreation, and optimizing abundance and diversity of wildlife and plant species. Goals and objectives for Des Lacs NWR can be found in Appendix A. Goals and objectives for Lostwood NWR can be found in Appendix B. Goals and objectives for Crosby and Lostwood WMD's can be found in Appendix C.

This Fire Management Plan is a detailed program of action to implement the above fire management policies and objectives.

C. Des Lacs Complex Fire History

Fire records for the Complex reflect a total of 47 fires from 1985 to the present. Lightning

caused fires have accounted for 8 natural ignitions or 17%, whereas human caused fires have resulted in 39 ignitions or 83% of total wildfires suppressed. Acreage consumed by lightening and human causes consist of 6913 acres and 4458 acres respectively.

Fires resulting from various railroad operations are the largest single source of human caused fires on the complex consisting of 21%. The second largest contributor to human caused fires has been agricultural activities which includes field burning and fires resulting from farm equipment totaling 13%. The remaining 66% of human caused fires have been a result of vehicle exhaust, playing with matches, smoking, power lines, or of an unspecified origin.

The Des Lacs NWR has shown the highest wildfire incidence rate on the complex with 30 fires since 1985. Lostwood NWR and Crosby WMD have incurred six wildfire suppression responses each with Lostwood WMD having incurred five.

Wildland fire frequency has averaged 3-4 fires per year for the complex with fire activity ranging from zero fires in wet years to 10 fires in abnormally dry years. Fire behavior generally observed on upland grassland sites is typically represented by active creeping or spreading flame fronts resulting in fires of 50 acres or less. Fire behavior may be greatly affected by the extent of green herbaceous vegetation occurring on a given site, moderating potential fire behavior where abundant quantities exist, and is primarily a factor of drought or seasonality. During high wind events fire behavior typically exhibits rapid rates of spread and extensive acreage burned. The complex has had 8 fires ranging in size from 160 to 6280 acres each under wind driven conditions.

Wildland fires on woodland sites have been primarily the result of passing trains setting fires in the herbaceous fine fuels within the right of ways and spreading into the adjacent deciduous brush and timber sites. These fires have resulted in burned acreage ranging from 0.1 to 15 acres, with multiple fires occurring in a single day. Fire behavior has typically resulted in low rates of spread, moderate intensities, and intermittent torching of brush and trees where ladder fuels exist. Duff layers and woody fuels are partially consumed creating the need for extensive mop up and subsequent monitoring and patrol. The potential readily exists on these sites to exhibit increased fire behavior and require extensive control forces to adequately contain and suppress a wildfire during periods of high wind and/or periods of low fuel moisture.

D. Effect of Fire Upon Complex Objectives

Fire, whether anthropogenic or caused by lightning, has been a natural part of the prairie for thousands of years (Sauer 1950, Higgins 1986). Fire provides one or more of the following benefits to prairie (Vogl 1974, Wright and Bailey 1982):

- G Removal of dead vegetation that hinders new growth.
- G Removal of litter and woody vegetation decreases the potential for catastrophic wildfire events.
- G Release of nutrients bound up in litter to enrich the soil.
- G Decrease of exotic grasses, forbs, club moss and woody plants and encourage native species.

G Recreate environmental conditions attractive to wildlife that existed during pre-settlement times.

Use of fire as a management tool in the Northern Great Plains began in 1965 (Higgins et al. 1989). Grasslands are burned primarily to manipulate vegetation, soil microbes, nutrient cycles, and to enhance the biological productivity and diversity of specific organisms, or to accomplish specific objectives. Specific objectives may be broad (prairie restoration and maintenance) or narrow (management for endangered or rare species or reduction of woody plants). Where native prairie is not a major component of the management area, nearly all prescribed fires are used to: reduce vegetative litter, control noxious weeds, reestablish native grasses through reseeding, or improve the chemical kill on exotic grasses prior to reseeding native grasses and forbs. Where native prairie is a major part of a management area, primary reasons for burning are to restore, improve, or enhance prairie habitat for wildlife. Occasionally, fire is used for specific reasons such as to reduce Kentucky bluegrass or other undesirable, exotic cool season grasses, to enhance native grass and forb growth, control undesirable shrubs or trees, or to enhance the esthetic appearance of an area. Fire is an essential tool for managing Complex lands for wildlife.

Fire can also negatively affect Complex programs when uncontrolled. Wildfires can burn vegetation that may be important habitat for certain species. Wildfires during some periods of the year may increase exotic grasses or other plants, creating favorable conditions for their spread or increased vigor. Wildfires may also cause damage to improvements and sensitive areas.

While short term damage from a wildfire to the Complex could be serious, long term effects on Complex resources would most likely be negligible or positive. Wildfires on Service lands that reach adjoining private lands could have disastrous economic consequences during certain periods of the year. Rural land use in the Complex area is primarily small grain farming and livestock grazing. Wildfires have the potential to eliminate individual crops or grazing lands during a season. Fires escaping from Service lands could have considerable negative economic and political implications.

While wildfires can produce positive effects for Complex resources, there is also a possibility of negative effects upon resources and public safety. Therefore, all wildfires are suppressed to minimize damage, and controlled prescribed fire is used to maximize benefits. Future guidelines resulting from the Federal Wildland Fire Management Policy and Program Review may allow the Service to utilize wildland fires to achieve management objectives providing they exist within established prescribed parameters.

III. DESCRIPTION OF AREA AND FIRE EFFECTS

A. Location

Des Lacs NWR is in northwestern North Dakota about 50 miles northwest of the city of Minot and 90 miles east of Montana; it borders southeastern Saskatchewan to the north. The long, narrow, riverine refuge extends 26 miles from the Canadian border to 8 miles south of Kenmare, North Dakota and contains 19,547 acres. Des Lacs refuge includes the main water areas and adjacent (up to 1 mile away) uplands of the Des Lacs River valley in Burke and Ward counties.

The 26,904-acre Lostwood National Wildlife Refuge is in Burke and Mountrail counties in northwestern North Dakota, 23 miles south of Canada and 70 miles east of Montana. The rolling to hilly, mostly native prairie refuge is a contiguous, irregular block of about 6 X 11 miles.

Lake Zahl NWR is in northwestern North Dakota 27 miles north of Williston, ND and 17 miles east of Montana, in Williams County and contains 3,219 acres of fee title land and an additional 520 acres of easement refuge land.

Shell Lake NWR is in southeastern Mountrail County, 40 miles west of the city of Minot, ND, and contains 790 acres of fee title land.

The Crosby-Lostwood WMDs are composed of lands in Burke, Divide, Mountrail, and Williams counties and 9 northern townships in the "gooseneck" of Ward County in northwestern North Dakota. The WMDs border Montana on the west, Canada on the north and most of the southern boundary is the Missouri River, and essentially covers all of northwestern North Dakota (approximately 8654 square miles). The WMDs manage 147 individual Waterfowl Production Areas (WPA's) covering 29,504 acres.

B. Physiography and Geology

This area of North Dakota overlaps three major physiographic regions, Drift Plain, Missouri Coteau, and Missouri Slope (Freers 1973, Bluemle 1977). Major land features are products of the Wisconsin glacier that reshaped the Missouri River and formed the prairie potholes of the Coteau between 12,000 and 40,000 years ago.

The distinctive physiography of the Des Lacs valley was created by glacial meltwater cutting through the vast ground moraine known as the Drift Plain. Upland topography changes from the gently rolling Drift Plain to steep ($>15^{\circ}$) slopes that descend 50-125 feet to the river valley. The slopes are interrupted with numerous wooded draws and coulees, which have intermittent streams that drain hundreds of square miles of adjacent Drift Plain.

Lostwood NWR lies within the 20-30 km wide Missouri Coteau, a physiographic region chiefly of moderate (100-300') relief, dead ice moraine deposited by the Wisconsin glacier over a previously occurring escarpment (Clayton and Freers 1967, Freers 1973, Bluemle 1977). Hummocky, knob-and-kettle topography typical of the Missouri Coteau consists almost entirely of non-integrated drainage; rainfall and snowmelt collect in wetland basins via surface runoff and subsurface seepage (LaBaugh 1986, Winter 1989). Presence of glacial till (Coleharbor formation) is evidenced by erratics and thin, gravelly, mostly loam soils. The far southern 5 mi² of LNWR has numerous deep, brushy coulees that drain into a 0.9-mi² saline lake.

Both Lake Zahl and Shell Lake NWRs lie at the juncture of the Missouri Coteau (to the north) and the Missouri Slope (to the south). Both drain into the Missouri River system. Lake Zahl drains into the Little Muddy River and Shell Lake drains into Shell Creek.

About half of the Crosby-Lostwood WMDs lands are within the Missouri Coteau. The Coteau is the continental divide between drainage into the Gulf of Mexico via the Missouri River and drainage into Hudson Bay via the Souris River. The Coteau extends from northwest Iowa northwest into western Saskatchewan. The Drift Plain, a vast, fairly flat ground moraine with numerous pothole depressions covers much of the northeastern half of North Dakota and comprises about 10 percent of the WMDs. The remaining 40 percent of the WMDs is located in the Missouri Slope, in the southern portion of Mountrail and Williams counties. FWS has few land interests in the Missouri Slope, mainly due to a relative lack of migratory bird habitat.

C. Climate

The "continental" climate of northwestern North Dakota is highly variable, resulting in periodic drought, severe winter blizzards (often as early as October or as late as April), low relative humidity, frequent cloudless days, brief but intense late afternoon thunderstorms (some with hail) in summer, early and late summer frosts, and frequent strong winds (>20-40 kph). There are huge annual, as well as daily, temperature fluctuations and precipitation is erratic (Kraenzel 1966, Jensen 1972). Average annual precipitation (1936-89) is about 42 cm, >75% of which falls as rain during April-September (U.S. Fish and Wildlife Service [FWS], unpubl. refuge files). Average monthly temperatures range from 20°C in July to -15°C in January; record high and low temperatures are about 43°C and -48°C. The prevailing wind is from the northwest. The growing season varies from 100 to 105 days, but is shorter by about 10 days in the Missouri Coteau .

An automated weather station is located at Lostwood NWR headquarters. The weather station can calculate fuel moistures and can be linked to the Weather Information Management System (WIMS) in order to produce daily fire weather predictions. The Complex is considered a class 1 semiarid area under the National Fire Danger Rating System (NFDRS).

Annual growing conditions for green up of cool and warm season grasses depends on precipitation and soil moisture. Vegetation during drought years often produce little and cure rapidly. Year to year variation in green up and curing of grasses affects fire danger throughout the growing season. The Complex fire season as determined by analysis of Des Lacs NWR Complex fire history is 130 days, from April 1 to June 9 and August 9 to October 7 (FMIS 2001).

D. Vegetation

1. Grasslands

Des Lacs NWR contains about 10,120 acres of native, mixed grass prairie and about 1860 acres of planted herbaceous cover. Major native grass species in mixed grass prairie are green needlegrass, needle-and-thread, western wheatgrass, and blue grama. Bearded wheatgrass, side-oats grama, big bluestem, and little bluestem occur uncommonly. Forbs are mainly asters, goldenrods and legumes. Western snowberry is the major, low-

growing shrub, but silverberry is fairly common. Introduced species, especially Kentucky bluegrass and smooth brome, have invaded and become dominant in most open grasslands on Des Lacs NWR.

Following is a description of grassland habitat on Lostwood NWR (taken from (Murphy 1993)):

"Lostwood NWR is in the *Stipa-Agropyron* association (Coupland 1950, 1974, Singh et al. 1983) in the mixed grass prairie of the Great Plains (Carpenter 1940, Whitman and Wali 1975, McGregor et al. 1986). Native prairie comprises 55% of Lostwood NWR; dominant indigenous species are needlegrasses, primarily green needlegrass and needle-and-thread grass, and wheatgrasses, but Kentucky bluegrass has invaded and become co-dominant. Dense stands of the low-growing shrub, western snowberry, currently dominate mesic sites and extend upslope toward xeric sites. Exotic grasses, mainly smooth brome, dominate mesic sites also (brome typically invades and spreads as a monotype from within decadent snowberry stands). Flora on xeric hilltops include blue grama, prairie junegrass, plains muhly, and threadleaf sedge as codominants with native wheatgrasses and needlegrasses. Abundant native forbs are mainly of the Families Asteraceae and Fabaceae."

"Twenty-one percent of the upland area on Lostwood NWR was broken and cropped for 5-40 years during 1910-55. Land cropped before the mid-1930s (about a third of all old cropland) has been partly reinvaded by native flora. Cropland farmed later was planted in the 1950s to smooth brome and other exotic grasses, which continue to dominate."

Primary vegetation on Lake Zahl and Shell Lake NWR uplands is native prairie, dominated by cool season grasses like Kentucky bluegrass and smooth brome, with native grasses present but declining. Western wheatgrass, green needlegrass and needle-and-thread grass, are predominant native grasses.

Crosby-Lostwood WMDs are also in the needlegrass-wheatgrass-grama grass association (Coupland 1950, 1974, Singh et al. 1983) in the mixed grass prairie of the Great Plains (Carpenter 1940, Whitman and Wali 1975, McGregor et al. 1986). Native prairie comprises 55 percent of the uplands in the Crosby-Lostwood WMDs. Upland native composition is generally similar to that described for Lostwood NWR.

About one-fourth of the upland area on WPAs within the Crosby-Lostwood WMDs was broken and cropped prior to purchase by the FWS. Some of this former cropland has been partly invaded by smooth brome and other exotic grasses, while most of this acreage has been seeded to Dense Nesting Cover.

Portions of upland areas with a cropping history on Des Lacs and Lake Zahl NWR's are seeded to Dense Nesting Cover (DNC) to provide quality nesting cover for waterfowl and other birds. DNC is composed of tall and intermediate wheatgrasses, alfalfa, and sweet clover.

2. Trees

Native woodland vegetation on Des Lacs NWR occurs mainly in coulees, though more

woodland exists among east- and northeast-facing slopes on the west side of the Des Lacs River valley compared to the east side. Woodlands are composed mainly of trees (American elm, green ash, box elder) and shrubs (chokecherry, junberry, ironwood, buckthorn, hawthorn, red-osier dogwood, willow) located where soil moisture is greatest. Trees have become more prevalent since fires were suppressed, coinciding with settlement of the area about 1900 and especially establishment of the refuge (Kraenzel 1966, Archibold and Wilson 1980), FWS refuge files. There are also about 50 shrub-tree shelterbelts and farmstead groves scattered throughout the refuge that were planted by early settlers and by the refuge in the 1930s-40s. These plantings include native as well as introduced species of trees and shrubs (e.g., Siberian pea, red cedar, Chinese elm, Russian olive, honeysuckle).

Trees (woody plants >6 m tall) comprise 2 percent of Lostwood NWR. Clumps of quaking aspen occur throughout the refuge. Aspen typically pioneers and spreads along wetland borders (Maini 1960). Other trees include 16 groups of 1-5 overmature or decadent eastern cottonwoods, a 12.4-acre grove of American elm bordering a major lake, and 17 small (0.2-1.2 ac) groves of stunted box elder or green ash at former farmsteads. Interspersed, tall shrubs (6-16 ft) comprise another 2 percent of Lostwood NWR and include mainly round-leaved hawthorn, chokecherry, serviceberry, willow, and shrub-stage aspen.

Trees comprise 1 percent of Crosby-Lostwood WMDs. Clumps of quaking aspen and planted shelterbelts and woodlots occur throughout the WMDs. Planted shelterbelts vary from one row wide to "wildlife" plantings 10-15 rows wide, containing evergreen and deciduous trees as well as native plum, chokecherry and buffaloberry shrubs. Some WPAs have no trees at all while others have woodlots, shelterbelts, and old farmsteads, and still others have native trees invading the prairie, due to the lack of fire.

3. Wetland Vegetation

Predominant wetland or aquatic vegetation on Des Lacs NWR is sago pondweed, cattail, hardstem and river bulrushes, spikerush, and common reed. These common wetland plants occur in all main refuge impoundments, with sago pondweed in open water and emergent vegetation around margins of the main lakes and throughout shallow and deep marsh areas.

Wetland basins make up 20 percent of Lostwood NWR and are diverse in size, type, and hydrologic features (fresh to saline, recharge or discharge regimes [LaBaugh 1986, Winter 1989]). There are about 4100 basins total, ranging from temporary and ephemeral ponds < 0.1 acre to permanent lakes > 1mi². Most are 1-5 acres seasonal basins, dominated by whitetop grass and slough sedge.

Lake Zahl marshes contain dense cattail and bulrush, with sago pondweed in the open water. Shell Lake is primarily an open water lake, with few emergent plants around the perimeter.

4. Endangered Plants

There are no known endangered plant species on the NWRs or WMDs. Des Lacs,

Lostwood, Lake Zahl, and Shell Lake NWRs are not within the range of any endangered plant species of the northern Great Plains (U.S. Fish and Wildlife Service 1992).

5. Noxious Plants

Several noxious plant species occur on the NWRs and WMDs. A problematic species in the northern Great Plains is leafy spurge. About 425 acres of uplands on Des Lacs NWR are dominated by leafy spurge. Lostwood NWR has about 60 acres of uplands infested with spurge. Shell Lake NWR contains about 2 acres of leafy spurge. Approximately 140 acres of WPA uplands are infested with leafy spurge in the WMDs. Other noxious weeds occurring on Des Lacs and Lostwood NWRs are Canada thistle, absinth wormwood and perennial sow thistle. In addition, spotted knapweed is found on one WPA. These species often compete with and negatively affect native plants (although sow thistle is a native species also, it sometimes invades in places away from wet meadows where it usually grows). The control of noxious plants is important to maintain native plant communities.

E. Wildlife

Many wildlife species could potentially occur on the Complex. Appendix D. contains a species list for the Complex. The information that follows is not intended to be exhaustive:

1. Endangered Species

Whooping cranes and gray wolves (FWS Endangered), and piping plovers ([Great Plains population] FWS Threatened) peregrine falcons and bald eagles occur on the Complex. Whooping cranes are observed annually during spring and fall migration, mostly feeding and resting in level to rolling cropland areas with scattered wetland basins. The migration route of the crane directly traverses the area. Bald eagles are uncommon fall and spring migrants and occur rarely during winter months (Murphy 1990). Concentrations of up to 30 bald eagles occur in late October, associated with the peak of snow goose migration (FWS, unpubl. refuge files). Peregrines are rare in fall but can be fairly common during early through mid-May; most migrants are apparently adults (subspecies tundrius), associated with peak spring shorebird migration (Murphy and Green 1992). Up to 50-60 pairs of piping plovers nest annually on open beaches of large, saline lakes on Lostwood NWR (Smith et al. 1993). Up to about 150 pairs of piping plovers nest annually on open beaches of large, saline lakes on Crosby-Lostwood WMDs; collectively, this represents about 10-15 percent of the Great Plains population of piping plovers (Ryan et al. 1993). Piping plovers arrive starting in mid-April and leave the area by late August (USFWS, unpubl. refuge files).

Gray wolves are a wide-ranging species and have been documented within the Complex. Sightings have been reported for Des Lacs NWR and within 30 mi of Lostwood NWR in recent years (U.S. Fish Wildl. Serv. Ecol. Serv., unpubl. records) and potentially could occur on the Refuges.

Several FWS "species at risk" occur on Complex. These include (1) northern goshawk, an occasional late fall through winter visitor, (2) black tern, a common nesting species of marshes, (3) loggerhead shrike, an uncommon nesting species, (4) Baird's sparrow, an

uncommon nesting species of upland prairie, (5) ferruginous hawk, which has declined but still occasionally nests (Murphy 1993).

At least 20 other species of special concern (as per state, FWS, and other lists) occur mostly as breeding species, such as Cooper's hawk, merlin, common tern, LeConte's and sharp-tailed sparrows, Sprague's pipit, yellow-breasted chat, long-eared owl, moose, pigmy shrew, yellow lady's slipper, and mealy primrose (Anonymous 1986; U.S. Fish and Wildlife Service 1987). Dakota skippers have been documented on the Lostwood NWR and Coteau Prairie WPA, and the area is well within the range of the tawny crescent butterfly (FWS candidate species) (Royer and Marrone 1992).

2. Invertebrates

There have been no quantitative studies of invertebrate populations on Complex lands, even though invertebrates comprise main foods of most breeding birds. Abundance and species composition of aquatic invertebrates in prairie wetlands relate especially to wetland hydrology and chemistry and basin morphology (reviewed by Kantrud *et al.* 1989). Populations of invertebrates that breed in seasonal wetlands tend to peak 1-2 years after the end of a drought. For example, midges (Chironomidae) are abundant in wet years and are one of the most important foods of water-dependent birds. Other important invertebrates in seasonal and semi-permanent wetlands include copepods, cladocerans, mollusks, amphipods, rotifers, hemipterans, and dipterans (Kantrud *et al.* 1989). Brine shrimp and shore flies dominate invertebrate fauna of saline lakes. Abundant terrestrial invertebrates are mainly insects and arachnids.

3. Fish

Viable fish populations occur in only a few permanent, relatively fresh lakes that occur in the Complex. Nearly all large lakes are too saline, too shallow, or have inadequate oxygen levels to support sustained fisheries. Northern pike, yellow perch, and occasionally rainbow trout or walleye are stocked in at least 10 large (100 acre to 3 mi²) prairie lakes and impoundments on FWS land. Most of these lakes are co-owned with private landowners. Fathead minnows and brook sticklebacks are native in most of these and about 10 other wetland basins in the Districts. They are also the only two native fish species tolerant of periodic, low dissolved oxygen and low water levels on Des Lacs NWR. No viable fish populations occur on Lostwood NWR. Game fish including northern pike, walleye, and yellow perch have been introduced to Des Lacs NWR by at least 2-3 different releases, but failed to sustain viable populations; these species sometimes may temporarily pioneer by way of the Des Lacs-Souris River system.

4. Reptiles and Amphibians

Broad surveys of refuge herpetofauna were conducted during the 1980s, mainly by using drift fences (Gibbons and Semlitsch 1981, Vogt and Hine 1982). Herptiles in the Complex include smooth green snake, plains garter snake, painted turtle, tiger salamander, leopard frog, chorus frog, and wood frog. Abundance of salamanders and frogs varies over years with wetland availability. In average years, tiger salamanders, leopard frogs, and chorus frogs are common (Murphy 1990). Wood frogs apparently are pioneering in the area; recent records on Lostwood refuge are the first in western North

Dakota (Murphy 1987). At least 2 species of toads (Bufo spp.) should occur in the area (Wheeler and Wheeler 1966) but have not been documented.

5. Birds

No comprehensive surveys of birds have been conducted specifically over the Complex. Birds are being quantitatively and qualitatively surveyed, however, at Lostwood NWR, which is near the center of the Complex. At least 226 species of birds occur on the refuge, of which at least 104 breed (Murphy 1990). Composition and abundance of refuge breeding birds have been documented in numerous surveys and research studies (Collins 1984, Green 1992); Murphy 1993; E. Madden unpubl. thesis data; A. Kruse and R. Murphy unpubl. data; Lostwood NWR unpubl. refuge files; Kruse and Bowen in review). At least all these species occur throughout the Complex, although relative abundances differ compared to Lostwood NWR. In addition, about 55-65 species are recorded on two 25-mile, USFWS Breeding Bird Survey routes conducted annually on the Complex, plus there are annual surveys of waterfowl (Anseriformes), mourning doves, and colonial nesting birds.

6. Mammals

Thirty-seven species of mammals have been documented on Lostwood NWR since 1935 (Murphy 1990). Most of the same species occur on Des Lacs NWR and the WMD's. Small mammals were surveyed in the mid to late 1980s in upland and low prairie communities by drift fence trapping and snap-trapping (Lostwood NWR, unpubl. files). Annual trends in abundance of jackrabbits, ground squirrels, beaver, and coyote and red fox have been documented also. Masked shrew, thirteen-lined ground squirrel, deer mouse, meadow vole, meadow jumping mouse, porcupine, coyote, and white-tailed deer are common mammals encountered. Uncommon mammals include mainly white-tailed jackrabbit, Richardson's and Franklin's ground squirrel, southern red-backed vole, muskrat, western jumping mouse, red fox, raccoon, long-tailed weasel, least weasel, mink, badger, and striped skunk. Mule deer, elk, and pronghorn are observed occasionally, and moose are expanding in the area. Refuge records of short-tailed and pygmy shrews are on their respective range margins (Jones et al. 1983). Appearance of beaver in the late 1940s and marked increases in porcupine and white-tailed deer populations since the 1930s, concurrent decreases in Richardson's ground squirrel and white-tailed jackrabbit populations, plus recent records of fox squirrel and woodchuck, relate largely to increases in woody cover on the refuge associated with fire suppression as well as regional changes in distribution of these species.

IV. DES LACS NWR COMPLEX FIRE MANAGEMENT POLICY & OBJECTIVES

A. Fire Management Considerations

The following considerations influenced the development of the Complex's fire management goals and objective. These observations are established in various sections of this plan.

1. Fire is an essential part of the native biotic communities in the Complex.
2. Uncontrolled wildfire has potential for negative impacts on and off the Complex.
3. Positive or negative effects of prescribed fire on vegetation, wildlife, and cultural resources depend on burning conditions and fuel loading.
4. Rapid rates of spread, fire suppression response times, and the lack of fuel breaks pose significant suppression problems and increase the likelihood of escape onto adjacent lands.
5. Use of the "Light Hand on the Land" minimum impact concept to minimize environmental damage is important throughout the Complex, and especially in the Lostwood NWR Wilderness Area.

B. Complex Fire Management Goals

1. Protect life, public and private property, and cultural and natural resources from wildfire.
2. Use prescribed fire as a tool to restore the natural fire regime and vegetative communities and to accomplish other refuge habitat objectives.

C. Complex Fire Management Objectives

1. Safely suppress all wildfires using strategies and tactics appropriate to safety considerations and the values at risk, and in accordance with Service policy.
2. Minimize the impact and cost of fire suppression.
3. Use prescribed fire to the fullest extent practical to restore the natural fire regime and vegetative communities and restore and perpetuate native wildlife species on the Complex.
4. Manage the risks associated with hazard fuels. Use prescribed fire near structural/wildland interface, sensitive resources and boundary areas to reduce the risk from wildfire damage.

5. Utilize prescribed fire when it is the most effective and efficient means for achieving management objectives.
6. Educate the public regarding the natural role of fire within the Complex's ecosystems.

V. FIRE MANAGEMENT STRATEGIES

The following strategies will be employed to meet fire management objectives.

- A. Suppress all wildfires using the Appropriate Management Response concept, commensurate with values at risk. Strategies employing a range of suppression options will be available to the Incident Commander. Minimum impact suppression techniques (MIST) will be used where and when appropriate.

Table 1: Appropriate Management Response

SITUATION	STRATEGY	TACTIC
1. Wildland fire on Refuge lands which does not threaten life, natural or cultural resources or property values.	Restrict the fire within defined boundaries established either prior to the fire or during the fire.	1. Holding at natural and man-made barriers. 2. Burning out. 3. Observe and patrol.
1. Wildland fire on Service property with low values to be protected. 2. Wildfire burning on to Service lands. 3. Escaped prescribed fire entering another unit to be burned.	Take suppression action, as needed, which can reasonably be expected to check the spread of the fire under prevailing conditions.	1. Direct and indirect line construction. 2. Use of natural and man-made barriers. 3. Burning out 4. Patrol and mop-up of fire perimeter.
1. Wildland fire that threaten life, property or sensitive resources. 2. Wildland fire on Service property with high values to be protected. 3. Observed and/or forecasted extreme fire behavior.	Aggressively suppress the fire using direct or indirect attack methods, holding the fire to the fewest acres burned as possible.	1. Direct line construction 2. Engine and water use. 3. Aerial retardant 4. Burn out and back fire. 5. Mop-up all or part of the fire area.

- B. Conduct all fire management programs in a manner consistent with applicable laws, policies and regulations.
- C. Due to the wide spread land holdings of the Service within the Complex (5 counties, 151 units), local fire agencies (volunteer fire departments) will be utilized for initial attack on wildfires in remote areas. Complex initial attack equipment and personnel are distributed to maintain a maximum response time of one hour to fires on Des Lacs and Lostwood NWR's during the fire season.

Cooperative agreements with local fire agencies will be maintained to provide for cooperative suppression actions and to ensure reimbursement is available. Provide assistance to local or federal cooperators under the "closest resource" concept in accordance with Service policy.

- D. Utilize prescribed fire as a management tool for achieving hazard fuel and resource management objectives. Hazard fuel prescribed fires will be used to reduce levels of unnatural fuel accumulations. Resource management ignited prescribed fire will be used to accomplish specific objectives established for individual land units. Where both treatment objectives exist, planning and implementation efforts will be combined where practical to provide for cost effective treatments. Prescribed fire will be used in a manner that seeks to emulate pre-settlement fire history to the extent practical.
- E. Initiate cost-effective fire monitoring, which will tell managers if objectives are being met. Monitoring information will also be used to refine prescribed burn prescriptions to better achieve objectives.
- F. Limits to Strategies

G Smoke management will be carefully considered for all prescribed burns and will be addressed in all prescribed burn plans.

G All fires occurring on the Refuge will be staffed or monitored until declared out.

G Prescribed burning in areas where threatened and endangered species exist will not be conducted if the prescribed fire will be detrimental to the species or any adverse impacts cannot be mitigated, Section 7 clearance will be secured, as appropriate.

G Heavy equipment (dozers, discs, plows, and graders) will not be used for fire suppression without the express approval of the Project Leader or his/her designee.

G The use of prescribed fire to achieve management objectives must be conducted in a cost effective manner.

G Aerial Retardants and foams will not be used within 300 feet of any waterway as described in the Guidelines for Aerial Delivery of Retardant or Foam near Waterways

G. Impact of Fire Management Activities

The Des Lacs NWR Complex is scattered throughout five northwest North Dakota counties in a primarily rural agricultural setting. Agricultural crops, limited ranching, and outdoor recreational use generate most of the economic

support to the area.. Communities are generally small, distant from each other, and have isolated farmsteads scattered throughout the townships. Wildland fuels consisting of prairie grasslands, pasture, and CRP typically surround these farmsteads and communities where the land use is not in agricultural cropland. The latter is a wildland fuel in itself when in a cured state, idle, or stubble condition. This composite of land uses provides the opportunity for wildland fire to pose a significant threat of large fire occurrence when weather and fuel conditions are right. Rural fire departments are few in number, generally equipment poor and provide coverage to numerous townships. Although the general public maintains a heightened concern in regards to wildfire, most communities are increasingly becoming aware of prescribed fire and the Complex's aggressive use of prescribed fire to maintain habitat and reduce the risk of severe wildfire and its associated impacts. Nevertheless, the social and economic concerns related to the perceived potential loss of grazing, haying, hunting, and wildlife continues to be an ongoing educational issue.

Fire management actions, whether through presuppression, suppression or prescribed fire activities, have the potential to impact refuge lands, neighboring lands, and associated land management practices. These activities are directly related to each other in that they are all driven primarily by the availability or lack of hazard fuel accumulations. Impacts from the use of fire can be both beneficial as well as detrimental depending on the social, ecological, and economic values to be considered.

Presuppression activities require coordination with city, rural and volunteer fire departments establishing mutual aid agreements, identifying wildland-urban interface concerns, and developing plans to mitigate known hazards. Meeting and planning sessions have been conducted with the Canadian Pacific Railroad to address wildland fire concerns and hazardous spill incidents. The railroad has historically been the greatest human caused factor of wildfires on the Des Lacs NWR. Local private and community involvement can be paramount in the planning process particularly as we begin to enter the wildland-urban interface planning arena. Impacts will generally be viewed as positive due to an enhanced safety and potential increase for fuels treatment projects which may provide additional economic activity. The communities of Fortuna, Kenmare, Lake Zahl, McGeor, Powers Lake, and Wildrose are initially being considered along with the DesLacs NWR and Lostwood NWR/WMD facilities as part of this process. These locations hold the greatest opportunity for wildland-urban interface incidents to occur due to shared boundaries, proximity to high value resources, and high levels of general public use.

Suppression activities are facilitated through the annual presuppression planning process described above, providing direction for suppression actions to be implemented on refuge fire management units as well as adjacent private lands that are covered under existing mutual aid agreements. Suppression impacts may run from nominal to severe depending on the location, habitat, soils, watersheds, access, tactics employed, and existing environmental conditions. Major concerns for refuge lands revolve around minimizing soil disturbance, protecting cultural and historic sites, providing adequate protection of refuge facilities and adjacent

private land resources, and ultimately ensuring for the life safety of staff, visitors and the general public. Impacts to neighboring landowners may result in short term smoke impacts on human health and visibility, damaged fences, loss of hay and grazing, and temporary depletion of water sites utilized as water sources during suppression operations. Worst case could result in loss of livestock, equipment or significant improvements (farmsteads).

Prescribed fire activities are planned and managed to minimize direct impacts to refuge lands as well as neighboring landowners and the general public. Nevertheless, downwind transport of smoke has the potential to impact homeowners, roadways, vistas on either a nuisance, awareness level, safety or health hazard basis. These issues are addressed in greater detail within each individual burn plan for mitigation measures. In the event of an escaped fire, potential for damage exists to adjacent refuge lands and real property and neighboring landowners' property, crops or equipment. These impacts are no different from suppression impacts except that the results are attributable to management planning and direct application of fire under specifically prescribed environmental conditions. Impacts as a result of losses attributable to a prescribed burn would have potential serious consequences from a social perspective, undermining the trust which the Complex has developed with neighbors over the past 20 years.

Neighboring lands have the same potential to impact refuge management practices through current or future land use activities. Field burning has been the number two cause of human caused fires impacting the Complex. Impacts could result in losses of improvements, grazing or hay contracts, costs incurred in suppression actions, and possible loss of habitat. The latter, in most cases might be considered beneficial depending on the location, time of year and planned future treatment of next prescribed fire application in light of the fact that fire historically occurred at all times of the year. Increased development of neighboring lands, aside from agricultural, may lead to greater wildland-urban interface issues, potential for greater economic losses, increased social issues such as smoke management, etc., and result in greater demands on fire management planning, implementing and budgeting. Changes in agricultural land uses that increase fuel loading over time will be problematic as well, requiring an increased focus on hazard fuel mitigation. The social views of neighboring landowners and general public that prescribed fire is a necessary tool may change over time and have the ability to curtail current levels of prescribed fire use if not addressed in a timely and proactive manner.

VI. FIRE MANAGEMENT UNITS

All lands within the Des Lacs NWR Complex are classified as full suppression. Des Lacs and Lostwood NWRs can each be broken into several fire management units plus an additional units for Crosby and Lostwood WMDs based on predominant fuel types, management restrictions, values at risk, and typical suppression strategies. All units are considered the same for both prescribed fire management areas and suppression zones.

A. Des Lacs National Wildlife Refuge (see map, Exhibit 1)

1. Upland Grassland Unit

a. Predominant Fire Environment

Upland topography changes from the gently rolling Drift Plain to steep ($>15^{\circ}$) slopes that descend 50-125 feet to the river valley. The slopes are interrupted with numerous wooded draws and coulees, which have intermittent streams that drain hundreds of square miles of adjacent Drift Plain. Vegetation is predominantly mid-grass prairie with scattered brush and trees. Vegetation is continuous with few natural or man-made fuel breaks. Mowed trails are minor firebreaks within the refuge. Major firebreaks consist of adjacent private farmland which may or may not contain grass type fuels, and grazed or ungrazed native prairie. Fires can be moderately intense with extreme rates of spread.

b. Access and Response Time

Access is available to 4-wheel drive vehicles via refuge trails, or section line roads off the refuge. Vehicle travel off trails is generally possible. Response time should be not more than 1 hour, and generally considerably shorter.

c. Values at Risk

The primary concern would be escape of fire from this unit onto private property, the City of Kenmare, or into the refuge wildland/structural interface area. Escape into these areas could pose a serious threat to life and property. An additional concern is the loss of fencing improvements that would limit future grazing management of the lands.

This unit serves as habitat for a wide variety of native wildlife species. Small fires pose no significant impact, and large fires may or may not impact wildlife and habitat depending on timing of burn. Large fires during nesting season or during the dormant season may reduce local breeding success by eliminating residual cover.

d. Management Restrictions

There are no restrictions other than Service policy.

e. Suppression Strategies

Primary suppression strategy is aggressive initial attack with engines. Indirect attack may be used to protect values at risk and/or if engines are unable to suppress the head of the fire directly because of extreme rates of spread, or topography prevents access.

2. Woodland Unit

a. Predominant Fire Environment

Topography is primarily steep slopes on both sides of the Des Lacs Valley. Vegetation is variable and includes deciduous woodlands interspersed with grass and brushlands. Primary fuels are green ash, elm and box elder trees, with western snowberry, chokecherry, juneberry and other shrubs and grasses, primarily smooth brome and Kentucky bluegrass. Most fires in this unit exhibit low to moderate intensity due to moisture levels, however, past fire suppression has allowed for the buildup of large amounts of woody fuels and ladder fuels with potential for high intensity surface and crown fires under drought or dormant conditions.

b. Access and Response Time

Access is available to 4-wheel drive vehicles via refuge trails. Vehicle travel off trails may be possible in some areas, but most areas are too densely vegetated for direct vehicle access. Response time should be not more than 1 hour.

c. Values at Risk

The primary concern would be escape of fire from this unit onto private property or into the refuge wildland/structural interface area. Escape into these areas could pose a serious threat to life and property. Additional losses could include fences. Tasker's Coulee Recreation Area lies within this area and includes a 1930's era picnic shelter constructed by CCC as well as a modern comfort station which would be at risk.

This unit also serves as habitat for a wide variety of native wildlife species. Small fires pose no significant impact. Large fires during nesting season or during the dormant season may impact breeding success.

d. Management Restrictions

There are no restrictions other than Service policy.

e. Suppression Strategies

Suppression strategy will be determined by circumstances. Low to moderate intensity fires will be directly attacked by handcrews and engines (provided access is possible). Indirect attack and containment strategies will be

used on intense fires or where steep terrain or dense undergrowth does not allow for a safe direct attack. The Upper and Middle and Lower Des Lacs lakes function as very effective firebreaks, but the lower marsh units, Units 3, 5, 6 and 8 may not stop fires even when wet during dormant season or under drought conditions due to large quantities of marsh vegetation.

3. Wetland Unit

a. Predominant Fire Environment

Flat to gently rolling topography, sub-irrigated meadow and emergent marsh wetland sites. Vegetation is mostly continuous but with natural fuel breaks in open water areas. Mowed dikes also provide fuel breaks. Fire intensity can be extreme in dormant or drought conditions or low to moderate during growing season.

b. Access and Response Time

Access to marsh and meadows areas is generally not possible, except during winter, therefore most access is limited to surrounding roads, trails and dikes that provide excellent access. Response time should be 1 hour or less.

c. Values at Risk

The primary concern would be escape of fire from this unit into grassland or woodland areas on the refuge, the City of Kenmare, adjacent private property or into the refuge wildland/structural interface area. Escape into these areas could pose a serious threat to life and property.

This unit also serves as habitat for a wide variety of native wildlife species. Small fires pose no significant impact. Large fires during nesting season or during the dormant season may impact breeding success. Recovery from fires in marshes is very rapid and would typically last only one growing season.

d. Management Restrictions

The use of Class A foams and heavy equipment should be avoided in wetland areas where practical. Infrequent use of Silvex or Phoscheck adjacent to wetland areas during prescribed fire operations subjects these areas to minimal amounts of overland flow or percolation of foam or retardant. Effects upon aquatic organisms in these situations are viewed as having an insignificant effect on the biotic community.

e. Suppression Strategies

Suppression strategy will be determined by circumstances, but is expected to be indirect in most cases, or direct attack from dry ground. Indirect attack and containment strategies will be used on most wetland fires. In some cases, open water serves as an effective firebreak, but in emergent marsh fires, the fire may

burn across water areas that contain standing fuels.

4. Structural/Interface Unit

a. Predominant Fire Environment

Topography is generally gently rolling to steep slopes. Vegetation is primarily mixed-grass prairie interspersed with brush, woodland, and tree rows. Dense Nesting Cover fields of tame grasses and legumes, Fuel Model 3, also occur. Fire behavior is generally similar to that of the Upland Grassland Unit (see above). Structural improvements such as buildings, flammable liquids, and electrical lines may also greatly increase fire intensity and spotting. Fires can be moderately intense with extreme rates of spread, especially in the early fall and spring seasons when fuels are cured and dormant and windy conditions exist.

b. Access and Response Time

Access is good in most areas and available to 4 wheel drive vehicles via refuge trails, and county, township or section line roads off the refuge. Vehicle travel off trails is generally possible. Fences are numerous and may slow response slightly. Response time should not more than 15-30 minutes locally, but could take up to 1.5 hours for fires on the north end of the refuge. Kenmare VFD is also available and response is less than 15 minutes for local fires. The Canadian Pacific railroad tracks located on the refuge may prevent quick access in some locations, because the railroad grade cannot be crossed.

c. Values at Risk

The primary concern would be the threat upon life safety or property damage to improvements in the adjacent community of Kenmare, refuge headquarters and residence area, and farmsteads on adjacent private lands.

d. Management Restrictions

There are no restrictions other than Service policy. Service policy restricts firefighters from directly engaging in structural firefighting activities, but not in structural protection.

e. Suppression Strategies

Primary suppression strategy within the unit will be aggressive direct attack. Indirect attack may be used to prevent a wildfire from spreading into this unit, or to protect structures. Protection of life and property will be the overriding priorities.

B. Lostwood National Wildlife Refuge (see map, Exhibit 2)

1. Upland Grassland Unit

a. Predominant Fire Environment

Unit is rolling to hilly prairie interspersed with wetlands of all types and sizes. Hummocky, knob-and-kettle topography typical of the Missouri Coteau over most of the unit's 41-mi² consists almost entirely of non-integrated drainage. Only the southern 5-mi² differs with numerous deep, brushy coulees that drain into a 0.9-mi² saline lake. Since the turn of the century, woody species have expanded to dominate upland habitats, with western snowberry covering >50% of uplands and most of the refuge changing from mixed-grass prairie to aspen parkland. Through the use of fire, several thousand acres of upland have been reverted back to primarily grassland, dominated by indigenous species of needlegrasses, wheatgrasses, and muhlies. Exotic species that have invaded and become codominant include Kentucky bluegrass, smooth brome, and quackgrass. Dense stands of low-growing shrubs, mostly western snowberry, currently dominate mesic sites and extend upslope toward xeric sites. Flora on xeric hilltops include short grass prairie species, primarily blue grama, prairie junegrass, plains muhly, and threadleaf sedge as codominant with native needlegrasses, wheatgrasses, and bluegrasses.

Trees comprise 2 percent of the refuge. Small clumps of quaking aspen occur throughout the refuge and average <1 acre in size with density of 12 clumps/mi². Interspersed, tall shrubs comprise another 2 percent of refuge.

Vegetation is continuous in large blocks with few natural or man-made fuel breaks. Mowed trails and graveled auto tour route are minor firebreaks within the refuge. Major firebreaks are adjacent private farmland which may or may not contain grass type fuels, grazed or ungrazed native prairie, large lakes, and State Highways 8 and 50 and Burke County Road 16. Fires can be moderately intense with extreme rates of spread.

b. Access and Response Time

Access is good in most areas and available to 4-wheel drive vehicles via refuge trails, and county, township or section line roads off the refuge. Vehicle travel off trails is generally possible. Wetlands are numerous and may slow response slightly. Response time should be quick, not more than 1 hour, and generally considerably shorter.

c. Values at Risk

The primary concern would be escape of fire from this unit onto private property or into the refuge wildland/structural interface area. Escape into these areas could pose a serious threat to life and property. An additional concern is the loss of fencing improvements on private property that would impact grazing management

of these lands.

This unit serves as habitat for a wide variety of native wildlife species. Small fires pose no significant impact, and large fires may or may not impact wildlife and habitat depending on timing of burn. Large fires during nesting season or during the dormant season may impact localized breeding effort and success.

d. Management Restrictions

There are no restrictions other than Service policy.

e. Suppression Strategies

Primary suppression strategy is aggressive initial attack with engines. Indirect attack may be used to protect values at risk and/or if engines are unable to suppress the head of the fire directly because of extreme rates of spread, or topography prevents access.

2. Wilderness Unit

a. Predominant Fire Environment

Similar to the Upland Grassland Unit. The unit is 9 mi² in the northwest corner of the refuge.

b. Access and Response Time

Access to the Wilderness area boundary is good on refuge roads and trails, and adjacent county roads and section line trails. Response time should be 0.5-1 hour by vehicle. Vehicles may be utilized for suppression within the Wilderness Area during emergencies which threaten the health and safety of people.

c. Values at Risk

The primary concern would be escape of fire from this unit onto private property. Escape into these areas could pose a serious threat to life and property. Most of the private lands adjacent are grazed native prairie, with fuels varying from light to moderate, depending on time of year and grazing pressure. Four residences and two abandoned structures are located within a one mile range of the Wilderness boundary.

This unit serves as habitat for a wide variety of native wildlife species. Small fires pose no significant impact. Large fires during nesting season or during the dormant season may impact breeding effort and success.

d. Management Restrictions

Management of this area is subject to the Wilderness Act and Service Wilderness Area restrictions. Wildfires will be managed using the appropriate management response concept. The use of heavy equipment, engines, chainsaws (motorized equipment) without the expressed approval of the Project Leader or his/her designee will not be allowed within this area.

e. Suppression Strategies

Suppression strategy will be determined by the values at risk. If no values are found to be at risk, initial attack may consist of either direct attack within the unit utilizing hand crews or indirect attack from the wilderness boundary, employing engines in conjunction with firing out operations, in an effort to contain the fire within the unit.

If the fire has potential to escape to private property or to significantly impact wildlife or improvements, aggressive initial attack will be made utilizing available resources (subject to management restrictions) to protect private property and/or minimize acres burned. Safety of personnel is paramount.

With the exception of fires occurring during periods of low to moderate fire danger as exhibited by smoldering or creeping fire behavior, it is anticipated that engines will be used on most wildfires when fires are actively spreading or running with indirect attack occurring from the boundary of the unit. All possible actions will be taken to maintain the integrity of the Wilderness Area.

Firebreaks are currently maintained around the Wilderness Area annually. The east boundary is a 15' disked line, the north and south boundaries are graveled roads, and the west boundary is a mowed and raked firebreak on the section line right-of-way. These firebreaks will help in keeping any wildfire within the unit boundaries.

3. Wetland Unit

a. Predominant Fire Environment

Unit has rolling prairie pothole topography, with several large lakes and interspersed low prairie, meadow and emergent marsh wetland sites. Vegetation is mostly continuous but with natural fuel breaks in open water areas. Mowed trails and graded roads also provide some fuel breaks. Fire intensity can be extreme in dormant or drought conditions or low to moderate during growing season.

b. Access and Response Time

Access directly to wetlands and meadow areas is variable depending on moisture conditions, therefore most access is limited to surrounding roads and trails that provide excellent access. Response time should be 1 hour or less.

c. Values at Risk

The primary concern would be escape of fire from this unit into upland areas on the refuge, adjacent private property or into the refuge wildland/structural interface area. Escape into these areas could pose a serious threat to life and property.

This unit also serves as habitat for a wide variety of native wildlife species. Small fires pose no significant impact. Large fires during nesting season or during the dormant season may impact breeding success. Recovery from fires in wetlands and meadows is very rapid and would last only one growing season.

d. Management Restrictions

There are no restrictions other than Service policy.

e. Suppression Strategies

Suppression strategy will be determined by circumstances, but is expected to be indirect in most cases, or direct attack from dry ground. Indirect attack and containment strategies will be used on most wetland fires. In some cases, open water serves as an effective firebreak, but in emergent marsh fires, the fire may burn across water areas that contain standing fuels.

4. Structural/Interface Unit

a. Predominant Fire Environment

Topography is generally gently rolling to steep slopes. Vegetation is primarily mixed-grass prairie interspersed with brush, woodland, and tree rows. Fire behavior is generally similar to that of the Upland Grassland Unit (see above). Structural improvements such as buildings, flammable liquids, and electrical lines may also greatly increase fire intensity, spotting and safety related concerns. Fires can be moderately intense with extreme rates of spread, especially in the early fall and spring seasons when fuels are cured and dormant.

b. Access and Response Time

Access is good in most areas and available to 4 wheel drive vehicles via refuge trails and roads. Vehicle travel off trails is generally possible, though travel may be somewhat limited in spring during thaw, depending on conditions. Fences are numerous and may slow response slightly. Response time should be quick, not be more than 15-45 minutes, though access to the west side of the refuge may take >1 hour. Bowbells, Stanley and Powers Lake VFD's are also available but response time will be at least 30 minutes as each VFD is located ~18 miles from refuge headquarters and adjacent refuge structures.

c. Values at Risk

The primary concern would be the threat to life safety or damage to property improvements at refuge headquarters and residence area, and farmsteads on adjacent private lands.

d. Management Restrictions

There are no restrictions other than Service policy. Service policy restricts firefighters from engaging in structural firefighting activities, but not in structural (exposure) protection.

e. Suppression Strategies

Primary suppression strategy within the unit will be aggressive direct attack. Indirect attack may be used to prevent a wildfire from spreading into this unit, or to protect structures. Protection of life and property will be the overriding priorities.

C. Crosby and Lostwood Wetland Management Districts (see map, Exhibit 3)

1. Upland Grassland Unit

a. Predominant Fire Environment

Unit is comprised of scattered Waterfowl Production Areas (WPA's) over the five northwest counties in North Dakota and two isolated National Wildlife Refuges. These units will all be classified the same, recognizing there are individual differences, but all fire environments are covered under Des Lacs and/or Lostwood NWR descriptions. There are a total of 147 WPA's covering 29,504 acres and the two refuges that comprise 3,929 acres. Most WPA's are located in hummocky, knob-and-kettle topography typical of the Missouri Coteau. Woody species have expanded to dominate upland habitats on many WPA's, with western snowberry covering >50% of uplands on those sites. Exotic grasses, mainly smooth brome and Kentucky bluegrass, dominate mesic sites also. Many units have fields planted to Dense Nesting Cover (DNC) consisting of tame grasses and legumes. These are generally taller, heavier fuels than native prairie and are categorized as Fuel Model 3. Flora on xeric sites include short grass prairie species, primarily blue grama, prairie junegrass, plains muhly, and threadleaf sedge as codominants with native wheatgrasses and needlegrasses.

Trees comprise <1 percent of the area and generally occur as remnant farmstead sites or tree rows.

Vegetation is generally continuous in blocks with gravelled roads or section line trails around the exterior with few trails within boundaries of WPA's. Major firebreaks often exist in the form of private farmland which is fallowed and devoid of vegetation, grazed or ungrazed native prairie, and open water wetlands. Fires can be moderately intense with extreme rates of spread.

b. Access and Response Time

Access is good in most areas and available to 4-wheel drive vehicles via county, township or section line roads around the WPA's. Vehicle travel off trails is generally possible. Wetlands are numerous and may slow response slightly. Response time varies considerably depending on location and whether the refuge or districts are contacted. Some areas near communities, may have a rapid response from local VFD, but response from the Service is expected to be at least 1 hour, and possibly longer.

c. Values at Risk

The primary concern would be escape of fire from this unit onto private property or into a wildland/structural interface area. Escape into these areas could pose a serious threat to life and property. An additional concern is the loss of fencing improvements that would limit future grazing management of the lands.

This unit serves as habitat for a wide variety of native wildlife species. Small fires pose no significant impact, and large fires may or may not impact wildlife and habitat depending on timing of burn. Large fires during nesting season or during the dormant season may impact localized breeding effort and success. Large fires that burn the entire WPA could have localized impact on wildlife populations if it is the only residual cover left in a large area. Some of the WPA's are islands of habitat in intensively farmed areas, and may provide the only wildlife habitat in an area.

d. Management Restrictions

There are no restrictions other than Service policy.

e. Suppression Strategies

Primary suppression strategy is aggressive initial attack with engines. Indirect attack may be used to protect values at risk and/or if engines are unable to suppress the head of the fire directly because of extreme rates of spread, or topography prevents access.

2. Structural/Interface Unit

a. Predominant Fire Environment

Topography varies considerably from site to site and is described above in Section 1. Vegetation is primarily mixed-grass prairie interspersed with brush, woodland, and tree rows. Fire behavior is generally similar to that of the Upland Grassland Unit (see above). Structural improvements such as buildings, flammable liquids, and electrical lines may also greatly increase fire intensity and spotting. Fires can be moderately intense with extreme rates of spread, especially in the early fall and spring seasons when fuels are cured and dormant.

b. Access and Response Time

Access is good in most areas and available to 4-wheel drive vehicles via county, township and section line trails and roads. Vehicle travel off trails is generally possible. Fences are numerous and may slow response slightly. Response time will be variable from .25-1 hour depending on location.

c. Values at Risk

The primary concern would be threat of damage to life or property improvements on adjacent private lands, communities, or Service owned shop and residence areas at Coteau Prairie and Carlson WPA's. Many communities have WPA's adjacent or within 1-2 miles.

d. Management Restrictions

There are no restrictions other than Service policy. Service policy restricts firefighters from engaging in structural firefighting activities, but not in structural (exposure) protection.

e. Suppression Strategies

Primary suppression strategy within the unit will be aggressive direct attack. Indirect attack may be used to prevent a wildfire from spreading into this unit, or to protect structures. Protection of life and property is the priority.

VII. FIRE MANAGEMENT ORGANIZATION AND RESPONSIBILITIES

The Complex Fire Management Officer (FMO) is delegated the coordination and planning activities of the fire management program by the Project Leader. The FMO reports directly to the Project Leader and works cooperatively with Refuge and Wetland District Managers to effectively implement fire management policy and procedures. The FMO coordinates with the managers for fair distribution of seasonal personnel required to accomplish resource management projects within the complex. The FMO is responsible for hiring and supervising a seasonal fire management staff of 2.0 FTE.

The fire job responsibilities listed within the Field Operations Guide (ICS-420-1) and those described for the positions below are to be fulfilled.

A. Project Leader

1. Responsible for overall management of the Complex including fire management.
2. Insures effective cooperative relations among NWRs and WMDs, cooperating fire organizations, and adjoining landowners.
3. Insures sufficient collateral duty firefighters meeting Service standards are available for initial attack.
4. Supervises the Fire Management Officer.
5. Responsible for planning programs to educate the public regarding the role of fire in the Complex and fire prevention.

B. Complex Fire Management Officer

1. Delegated the responsibility for coordination and oversight of the fire management program by the Project Leader.
2. Supervises the Complex's seasonal fire staff.
3. Responsible for implementing and facilitating the fire management program for the Des Lacs Complex, including fire management planning, employee development, wildfire presuppression and suppression activities, prescribed fire plan implementation, including the following activities:
 - a. Fire training
 - b. Physical fitness testing and Fire Management Information System (FMIS) data entry
 - c. Fire cache and equipment inventory, maintenance and operations
 - d. Coordinating with cooperative agencies. Revises cooperative agreements as necessary
 - e. National Fire Danger Rating System (NFDRS) and WHIMS use
 - f. Presuppression planning and implementation

- g. Prepares annual FireBase budget request. Also, approves and tracks use of FireBase account
- h. Monitors and briefs Complex staff of fire situation and potential
- I. Prepares a Complex fire prevention plan, and coordinates fire prevention duties with other employees
- j. Annually updates the Fire Management Plan
- 4. Responsible for coordinating and directing all suppression activities and associated personnel including:
 - a. Dispatching
 - b. Incident Command
 - c. Insures fire management policies observed
 - d. Advises Project Leader of the status of fire suppression operations
 - e. Administers the suppression evaluation process on wildfires
 - f. Maintains Interagency Red Card Qualifications at a
- 5. Responsible for managing prescribed fire activities including:
 - a. Coordinates and assists with implementation of annual prescribed fire program to meet management objectives
 - b. Prepare or approve individual prescribed fire plans for Complex
 - c. Serve as or designate an alternate Prescribed Burn Boss as needed
 - d. Provides daily validation that prescribed fires are under prescription and meet all other Service policy requirements
 - e. Proposes annual hazard fuel reduction and resource management prescribed fire projects
 - f. Assists Complex biologists with fire research and fire effects monitoring.
 - g. Maintains Interagency Red Card Qualifications at a
- 6. Assists in the operation of the fire public relations program.
- 7. Maintains liaison with Zone FMO, Regional Fire Management Coordinator, and Cooperators.
- 8. Ensures that required annual refresher training is completed.
- 9. Maintains fire records, and reviews completed DF-1202's for
- 10. Upon request and with the concurrence of the Project Leader,
- 11. Serves as an instructor and/or course coordinator for regionally
- 12. Participates in interagency wildland fire suppression operations,
- 13. Upon request, assists the Zone FMO with the coordination of

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C. Refuge Manager, Des Lacs National Wildlife Refuge

- 1. Maintain assigned engine(s) and fire equipment cached at refuge in a state of readiness in absence of FMO.
- 2. Supervises and trains assigned fire crew in absence of FMO.

3. Serves as needed on wildfires, generally as Engine Boss or Incident Commander, if qualified.
4. Supervises the resource management activities on land management units on the refuge including the selection of objectives and management options to be used in achieving objectives (including prescribed fire). Works with Complex biologist in selecting objectives and management options to achieve them including prescribed fire.
5. Prepares individual prescribed burn plans for Des Lacs NWR units.
6. Insures subordinates/fire crew satisfactorily completes assigned prevention, presuppression, training, and monitoring duties in absence of FMO.
7. Able to achieve ICS Red Card Qualifications of ICT5, RXB3.

D. Refuge Manager, Lostwood National Wildlife Refuge

1. Maintain assigned engine(s) and fire equipment cached at Lostwood Refuge in a state of readiness.
2. Supervises and trains assigned fire crew as needed.
3. Serves as needed on wildfires, generally as Engine Boss or Incident Commander, if qualified.
4. Supervises the resource management activities on land management units on the refuge including the selection of objectives and management options to be used in achieving objectives (including prescribed fire). Works with Complex biologist in selecting objectives and management options to achieve them including prescribed fire.
5. Prepares individual prescribed burn plans for Lostwood NWR units.
6. Insures subordinates satisfactorily completes assigned prevention, presuppression, training, and monitoring duties.
7. Fire weather station operation, maintenance, and data entry.
8. Able to achieve ICS Red Card Qualifications of ICT5, RXB3.

E. Wetland District Manager, Crosby and Lostwood WMD's

1. Maintain assigned engine(s) and fire equipment cached at district in a state of readiness.
2. Supervises and trains assigned fire crew as needed.
3. Serves as needed on wildfires, generally as Engine Boss or Incident Commander, if qualified.
4. Supervises the resource management activities on land management units on the refuge including the selection of objectives and management options to be used in achieving objectives (including prescribed fire). Works with Complex biologist in selecting objectives and management options to achieve them including prescribed fire.
5. Prepares individual prescribed burn plans for District units.
6. Insures subordinates satisfactorily completes assigned prevention, presuppression, training, and monitoring duties.
7. Able to achieve ICS Red Card Qualifications of ICT5, RXB3.

F. Complex Biologist

1. Coordinates fire monitoring program to determine if resource management prescribed fires accomplish objectives.

2. Reviews annual prescribed burning plan for Complex to ensure sound biological principles are being followed, resource management objectives are valid, and sensitive resources are not being negatively impacted.
3. Provide technical/biological support to managers in selecting appropriate resource objectives and the best management options to use in accomplishing selected objectives, to include prescribed fire.

G. Seasonal and Collateral Duty Firefighters

1. Responsible for their personal protective equipment and physical conditioning.
2. Successfully completing annual pack by April 1st or within 2 weeks of EOD date.
3. Maintaining assigned fire equipment in ready state and using all safety gear assigned.
4. Assisting the Fire Management Officer in maintaining accurate fire records.
5. Satisfactorily completing assigned work projects in a timely fashion.
6. Available for interagency fire dispatches.

H. Wildfire Incident Commander (as assigned)

1. The Incident Commander (IC) will be responsible for the safe, effective and efficient suppression of the assigned wildfire.
2. Fulfill the duties described for the IC in the Fireline Handbook (PMS 410-1).
3. Notify the FMO of all resource needs and situation updates, including the need for extended attack.
4. Ensure wildfire behavior is monitored and required data is collected.
5. Ensure that personnel are qualified for the job they are performing.
6. Identify and protect endangered and threatened species and sensitive areas according to the Fire Management Plan.
7. Utilize minimum impact tactics where appropriate.
8. Ensure fire is appropriately staffed until declared out.
9. Submit completed DI-1202 wildfire report, crew time sheets, and a listing of any other fire related expenditures, losses or refurbishment items to FMO within 3 days of fire being declared out.

I. Prescribed Burn Boss (as assigned)

1. Implement approved prescribed burn plans appropriately.
2. Assist with the administration, monitoring, and evaluation of prescribed burns. Submit completed DI-1202 and complete Post-Burn section of prescribed burn plan.

J. Fire Cooperators

Along with other land management agencies, the Service has adopted the National Interagency Incident Management System (NIIMS) Wildland and Prescribed Fire Qualification Subsystem Guide, PMS 310-1 to identify minimum qualification standards for interagency wildland and prescribed fire operations. PMS 310-1 recognizes the ability of cooperating agencies at the local level to jointly define

certification and qualification standards for wildland fire suppression. Under that authority, local wildland fire suppression forces will meet the standards established for their agency or department. All personnel participating in prescribed fire management activities must meet Service fitness and training standards.

Cooperators will:

1. Provide assistance in detection and suppression of wildfires as defined in cooperative agreements and memorandums of understanding.
2. Assist, as needed, in the investigation of suspicious fires.
3. Assist in training and participate in appropriate Rural Volunteer Fire Department sponsored training.
1. Complete Pre-attack Assessment of buildings and structures in conjunction with cooperators.

The following fire departments have current cooperative agreements with the Des Lacs NWR Complex (Appendix K & L):

1. Kenmare Rural Fire Department, Kenmare, North Dakota
2. Stanley Rural Fire Department, Stanley North Dakota
3. Bowbells Rural Fire Department, Bowbells, North Dakota
4. Powers Lake Rural Fire Department, Powers Lake, North Dakota

VIII. WILDLAND FIRE PROGRAM

A. Fire Prevention

1. General

Eighty-three percent of 47 wildfires occurring in the Complex since 1985 were human-caused. Human caused fires have the potential to be the most damaging because they typically occur at a time of year (generally fall and spring) when fuels are cured, fire behavior is explosive, fuel loading is high, and fewer initial attack resources are available. The season of burning in surrounding agricultural fields occurs in spring and fall, and has been the cause of at least five wildfires. In addition, the Complex has responded to 15+ wildfires (under Cooperative Agreements) on private lands where the cause has been due to open burning of trash or hay bales, and agricultural equipment. Des Lacs NWR is also subject to frequent train-caused wildfires, as the Canadian Pacific Railroad passes through the refuge for 11 miles.

In general the public and visitors to the Complex are aware of fire prevention and have an ingrained fear of prairie fires. As a reminder, the Complex will focus on placing fire prevention information and hints on Complex kiosks. The Complex will also post special warnings/notices, media news releases, area closures, and increase patrols during periods of very high or extreme fire danger as part of step-up preparations. Equipment and/or public use restrictions may also be made when needed.

An additional fire prevention measure taken is the mowing of refuge roads, trails, and parking areas to prevent visitor vehicle use from starting fires. This project requires about 2 weeks of labor by heavy equipment operators. In some instances, farming cooperators are used to hay firebreaks, roads and trails on the Complex. This method removes fine grass fuels at no cost to the Service.

2. Fuels Management

Because of the absence of fire from the prairie due to human intervention, and the productivity of the Great Plains, excessive fuel loading of extremely flammable fuels exist on much of the lands in the Complex. Habitats can be damaged by wildfire on land having excessive fuel loading, because of the potential to burn deeply into the organic soil layer, damaging soil structure, roots and rhizomes and the biotic soil community. Fuels management must be undertaken to ensure catastrophic events don't occur. The Complex will use prescribed burns at strategic times when fire behavior is moderate in an effort to remove excessive fuels from refuge and district lands, but at the same time maintaining minimal impact to the resources.

B. Fire Behavior Potential

See previous sections.

C. Presuppression

1. General

The FMO and refuge and district managers are responsible for coordinating presuppression activities. Specific duties are assigned in the Step Up Plan. The fire season runs from April 1 through October 30. The wildfire season as calculated by analysis of FMIS data is 130 days, April 1 to June 9 and August 9 to October 7.

2. Personnel

Only qualified employees meeting the fitness and training requirements of assigned positions will be dispatched to fires. Employees not meeting requirements may assist in support capacities, but will not be permitted on the fireline. The FWS Fire Management Handbook will be referred to for specific policy guidance on qualification standards. The following minimum fire qualification levels will be target goals to be maintained at the respective refuge or district field station. Current fire staff qualifications are listed in appendix I.

Des Lacs NWR:

<u>Position</u>	<u>Number needed</u>
initial attack incident commander (ICT5)	1
firefighter (FFT2)	1
engine operators (ENOP)	1

Lostwood NWR:

<u>Position</u>	<u>Number needed</u>
initial attack incident commander (ICT5)	1
firefighter (FFT2)	1
engine operator (ENOP)	1

Crosby WMD:

<u>Position</u>	<u>Number needed</u>
initial attack incident commander (ICT5)	1
firefighter (FFT2)	1
engine operator (ENOP)	1

Lostwood WMD:

<u>Position</u>	<u>Number needed</u>
initial attack incident commander (ICT5)	1
firefighter (FFT2)	1
engine operator (ENOP)	1

In addition to collateral duty fire personnel, the Complex needs to maintain a seasonal engine crew during the fire season. Fire crew members will be qualified at the FFT2 level for fire suppression.

Additional firefighters may be temporarily positioned at the Complex, or existing seasonal fire crew appointments may be extended using severity or emergency presuppression funding when very high or extreme fire conditions warrant.

3. Training and Physical Fitness

Annual Refresher Training

The safety of firefighters and the public is the first priority. Persons engaged in fire suppression activities are exposed to a high element of risk. The Refuge Manager and fireline supervisors must make every effort to reduce the exposure to risk and enhance performance. One way is through formal and on-the-job training and improved physical fitness. The Service has adopted the training and fitness standards established in 310-1, and all firefighters must meet these and other standards established by the Service to participate in fire management activities.

All personnel involved in Fire Management activities are required to annually complete fire management refresher training in order to be qualified for fire management activities in that calendar year. Refresher training will concentrate on local conditions and factors, the Standard Fire Orders, LCES, 18 Situations, and Common Dominators. NWCG and other courses are available that meet the firefighter safety requirement; but, efforts will be made to vary the training and use all or portions of other NWCG courses to cover the required topics. Fire shelter use and deployment under adverse conditions, if possible, must be included as part of the annual refresher.

Physical Fitness

All personnel involved in fire management activities will meet the fitness standards established by the Service and Region. At this point in time, firefighters participating in wildfire suppression must achieve and maintain an Arduous rating. Firefighters participating in Prescribed Burns must achieve and maintain a Moderate rating. Information found in Appendix H provides specific instructions to administer the tests, a health screening questionnaire to aid in assessing personal health and fitness of employees prior to taking the test, an informed consent form, and safety considerations. A trained and qualified American Red Cross First Responder (or equivalent) who can recognize symptoms of physical distress and appropriate first aid procedures must be on site during the test.

Wildland fire fitness tests shall not be administered to anyone who has obvious physical conditions or known heart problems that would place them at risk. All individuals are required to complete a pre-test physical activity readiness

questionnaire prior to taking a physical fitness test. They must read and sign the Par-Q health screening questionnaire, an informed consent form (Appendix N). If an employee cannot answer NO to all the questions in the PAR-Q health screening questionnaire, or is over 40 years of age, unaccustomed to vigorous exercise, and testing to achieve a Moderate or Light rating, the test administrator will recommend a physical examination. As noted below, all individuals over 40 years of age must receive an annual physical prior to physical testing.

Physical Examinations

In keeping with Service Policy, a physical examination is required for all new permanent employees and all seasonal employees assigned to arduous duty as fire fighters prior to reporting for duty. A physical examination may be requested for a permanent employee by the supervisor if there is a question about the ability of an employee to safely complete one of the work capacity tests. All permanent employees over 40 years of age who take the Pack or Field Work Capacity Test to qualify for a wildland or prescribed fire position are required to have an annual physical examination before taking the test.

4. Equipment

Engines are the primary initial attack resource on the Complex because of the predominance of fine fuels, and relatively good vehicle access to most lands. Hand crews and portable pumps are generally not utilized in fast moving grassland prairie fires. Residual burning into heavy duff layers does not usually occur, but may occur under severe drought conditions. Earth-moving equipment is available but not recommended for use due to resource damage concerns. A complete inventory of primary (dedicated) and secondary fire equipment in contained in Appendix E. Primary equipment is that equipment which is essential to firefighting and prescribed burning operations and maintained and used for that purpose exclusively. Secondary equipment is that equipment purchased with either refuge Operations and Maintenance funds or fire suppression funds, and with uses for both fire and non-fire refuge operations. All maintenance of primary fire equipment is funded out of fire funds. The maintenance of secondary equipment is charged to fire or refuge operations depending on use.

Currently the Complex maintains the following primary fire equipment at the following field station locations:

Des Lacs NWR

Heavy engine 2000 gallon (type 4X)	1
Heavy engine 1000 gallon (type 4X)	1
Light engines 200 gallon (type 6X)	2
Water tender 1000 gallon (type 3X)	1
10 person equipment and PPE cache	

Lostwood NWR

Heavy engine 1000 gallon (type 4X)	1
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Light engine 200 gallon (type 6X)	1
Wetliner trailers	2

Crosby WMD

Light engine 200 gallon (type 6X)	1
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Lostwood WMD

Light engine 200 gallon (type 6X)	1
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All firefighters are issued the required personal protective equipment. All primary engines are equipped with hand tools, firing devices, and water handling equipment. Chainsaws and portable pumps are available at each field station.

D. Emergency Presuppression

Staffing Class breakpoints were determined using a FIREFAMILY analysis of 10 year fire weather data from a fire weather station at Theodore Roosevelt National Park in Medora, ND (140 miles southwest of Des Lacs Complex Headquarters).

Staffing Class Burning Index Range

Fuel Model N (tallgrass)

I	0-21
II	22-43
III	44-88
IV	89-109
V	110+

The Complex will use its remote automated weather station located at Lostwood NWR HQ with computer software to produce National Fire Danger Rating (NFDRS) calculations. Two years of onsite data (4/94-4/96) will be used to calculate Complex specific burning index breakpoints. The new breakpoints will be compared to the above breakpoints from Medora, ND and modifications will be made. Until this site specific NFDRS data can be used, the Complex will follow a Step Up Plan based on the North Dakota Rangeland Fire Danger Index.

The low to moderate complexity of grass fuels and low wildfire frequency at Des Lacs NWR Complex may not warrant daily use of the National Fire Danger Rating System (NFDRS) and the Weather Information Management System (WIMS). The Rangeland Fire Index is calculated daily during fire season by the National Weather Service in Bismarck, North Dakota. Greenness factors of fuels are calculated by an Advanced Very High Resolution Radiometer (AVHRR) onboard NOAA weather satellites. Satellite calculated greenness factors are combined with forecasted windspeed and relative humidities. The data is accurate enough to calculate greenness factors and fire danger ratings by county. The North Dakota Rangeland Fire Danger Index can be received daily by fax if needed at Des Lacs NWR headquarters.

As indicated previously, periods of drought can greatly impact fire behavior and

resistance to suppression. For that reason the Rangeland Fire Danger Index, Palmer Drought Index, and the Keetch-Byram Drought Index will be monitored at a minimum on a weekly basis throughout the year. All are available on the Internet at <http://ndc.fws.gov>. The Refuge fire staff can also contact the North Dakota Dispatch Center (701-768-2552) during periods of high fire danger to track indices and anticipate possible fire activity. Presuppression actions have been identified in the Step-Up Plan to respond to unusual conditions associated with drought and other factors (See Appendix E).

Large scale fire suppression activities occurring in various parts of the country can have an impact on local fire management activities. For example, resources may be limited to implement prescribed fire activities because the closest available resources may be assigned to fire suppression duties or Refuge personnel may be involved as well. Regional drought conditions may also tie-up local resources that would normally be able to assist with Refuge fire management activities. It may be necessary to go out of Region to get the resources needed to meet the Refuge Step-up Plan during periods of extreme drought or high fire danger.

The Refuge is in the Northern Rockies Area. During National and Regional Planning Levels IV and V, it is necessary to receive approval from the Regional Fire Management Officer and the concurrence of the Northern Rockies Area Coordination Group to conduct prescribed burns during PL IV and the National Coordination Group during PL V.

The FMO in conjunction with other Managers will monitor current and predicted fire weather reports and take appropriate actions as listed in the following Fire Step Up Plan.

DES LACS NWR COMPLEX FIRE STEP UP PLAN

PRESUPPRESSION ACTIONS	RANGELAND FIRE INDEX¹				
	L	M	H	VH	EX
FIRE STAFF					
* Dress in nomex and boots, carry PPE while on duty, and maintain radio contact with headquarters	X	X	X	X	X
* Maintain a maximum response time (with assigned engine at duty station) of:	1 hour	30 min	10 min	0 min	0 min
* Remain with assigned engine at station or on patrol				X	X
* Work weeks and/or tours of duty may be extended				X	X
REFUGE STAFF FIREFIGHTERS					
* Carry PPE while on duty	X	X	X	X	X
* May be assigned to an engine at a station or patrol				X	X
* Work weeks and/or tours of duty may be extended				X	X
FIRE EQUIPMENT					
* Type 6x and 4x engines in ready status ² at DNWR	2	3	4	4	4
* Type 6x and 4x engines in ready status at LNWR	1	2	2	2	2
* Type 6x engine in ready status at CWMD	0	1	1	1	1
* Type 6x engine in ready status at LWMD	0	1	1	1	1

FIRE PREVENTION ACTIVITIES					
* Post fire danger signs at high public use areas				X	X
* Restrict vehicles to paved/gravel parking areas or within boats and close select trails and public use areas				X	X
MISCELLANEOUS EMERGENCY PRESUPPRESSION ACTIONS					
* Increase one staffing class if lightning activity is probable			X	X	X
* Preposition FWS and Interagency resources				X	X
* Notify North Dakota Zone Dispatch of staffing class and status			X	X	X
* Notify RFMC and open emergency presuppression/severity acct.				X	X
All components of the plan may not be met at times when resources are assigned to ongoing fires ³					

Notes:

¹L=low, M=medium, H=high, VH=very high, EX=extreme

²Ready status is unmanned, but filled (except in winter) and ready to respond.

³Resources assigned to fires may prevent some staffing actions - FMO should use common sense in determining whether to fill behind dispatched resources.

Once an emergency presuppression/severity account is established/available the FMO may authorize overtime for Very High or Extreme step up actions that can not be met with regularly scheduled employees. Collateral duty firefighters may be assigned emergency presuppression duties if needed. It may be impossible for the FMO to meet some staffing actions once Complex resources have been dispatched to a fire. It will be up to FMO, with Project Leader concurrence, to determine if outside assistance should be ordered to fill behind employees.

E. Severity and Emergency Presuppression Funding

Severity funding is different from Emergency Presuppression funding. Emergency Presuppression funds are used to fund activities during short-term weather events and increased human activity that increases the fire danger beyond what is normal. Severity funding is requested to prepare for abnormally extreme fire potential caused by unusual climate or weather events such as extended drought. Severity funds and emergency presuppression funds may be used to rent or preposition additional initial attack equipment, augment existing fire suppression personnel, and meet other requirements of the Step-up Plan.

Emergency Presuppression and Severity funds will be requested in accordance with the guidance provided in the Service's Fire Management Planning Handbook. As a general guide, Severity funding will be requested if a severe drought is indicated by a Palmer Drought Index reading of -4.0 or less or a Keetch-Byram Drought Index of 600 or greater and a long-range forecast calling for below average precipitation and/or above average temperatures. Drought Indices can be located at:
<http://www.boi.noaa.gov/fwxweb/fwoutlook.htm>

Severity funding may be essential to provide adequate fire protection for the Complex during drought years. Severity funds may be used to hire additional firefighters, extend firefighter seasons, or to provide additional resources. The FWS Fire Management Handbook provides guidelines for using severity funding.

During the fire season, Severity funds will be requested if a severe drought is indicated by one or more of the following:

Indicator	Situation or Condition
KBDI drought indices	600+
Palmer drought index	Severe
1000 hour fuel moisture	8 - 12 %
Energy Release Component	45-60
Long Range Forecasts	Below average precipitation and/or above average temperatures.

Outside of fire season, severity funding will be requested when severe drought is indicated by a combination of these factors and the previous growing season was excellent.

Requests for severity funding will be made to the Branch of Fire Management through the Regional Fire Management Coordinator, and requires approval/concurrence of all parties. Once approved, severity funds may be used to hire additional firefighters, extend firefighter seasons, or to provide additional resources (engines, aircraft, etc.).

F. Detection

The Complex relies on adjacent landowners, visitors, and cooperators to detect and report fires. In addition, the Step Up Plan provides for increased patrols by Complex personnel during periods of very high to extreme fire danger.

There may be occasions when unqualified personnel discover a wildland fire. When this occurs the employee should report the fire and request assistance before taking action to suppress or slow the spread of the fire. If the fire poses an imminent threat to human life, the employee may take appropriate action to protect that life before requesting assistance. The unqualified personnel will be relieved from direct on-line suppression duty or reassigned to non-fireline duty when qualified initial attack forces arrive.

G. Pre-attack Plan

Pre-attack planning data will be compiled by the FMO and seasonal fire staff. Once finished, pre-attack plans will be included as Appendix G of this plan and copies placed in each engine. Final pre-attack plans will include:

1. Response map

- roads, fences, and gates
- fire stations/caches
- airports
- helispots

water sources (type and flow)
mutual aid zones/fire cooperator districts

2. Hazard/Risk map

potential values at risk zones (high, medium, low)
hazard potential zones (high, medium, low)

3. Natural and Cultural Resources map

sensitive zones
non-sensitive zones
restricted vehicle access areas

4. Structure Protection Assessments

5. Closure/Evacuation procedures

H. Fire Suppression

1. General

All wildfires will be managed using the appropriate management response concept. Fire use benefits will not be used to determine the appropriate management response. All management actions will be in accordance with Service policy. Service policy requires the Complex to utilize the ICS system and firefighters meeting Service qualification requirements for fires occurring on Service property. Personnel responding to interagency fires off Complex must meet NWCG qualification requirements in addition to Service requirements. Mutual aid resources responding from fire departments to Service fires will not be required to meet Service fire qualification standards, but must meet the standards set by their own department. Mutual aid resources will report to the Incident Commander (IC) and receive their assignment and will be the first priority for release.

2. Reporting

All fires occurring within or adjacent to the Complex will be immediately reported to appropriate field station office or Complex headquarters. The refuge staff employee receiving the report will be responsible for initiating the Complex Fire Dispatch Plan, providing a Fire Dispatcher, and notifying the FMO of the existing situation and potential for escalation of the incident. The Complex dispatcher may be ordered if needed.

For local fires, the Fire Dispatcher will stay on duty until all Complex resources return or until released by Incident Commander. The Fire Dispatcher is responsible for monitoring and recording the radio traffic of Complex firefighters. The FMO or acting will be notified and kept abreast of the fire situation. The Fire Dispatcher will be responsible for coordinating the filling and delivery of any resource orders made by the IC including engines, aircraft, tools, supplies, and meals. IC's will place all resource orders through

the dispatcher, and will specify what is needed, and when and where it is needed. The Dispatcher will promptly determine if the resource orders can be filled or procured locally and notify the IC. If a resource order can not be filled locally, e.g., a helitack crew, the Dispatcher will place the order with the North Dakota Interagency Dispatch Center located at J. Clark Salyer NWR.

3. Initial Attack

All fires on the Complex staffed by FWS employees will be supervised by a qualified Incident Commander. The IC will be responsible for all aspects of the management of the fire. If a qualified IC is not available, one will be ordered. The IC will select the appropriate suppression strategies and tactics.

The IC will be responsible for all aspects of the management of the fire. Minimum impact suppression tactics will be used whenever possible. Dozers, plows, discs, or graders will not be used inside the Complex boundaries for fire suppression without direct approval of the Refuge Manager.

The Incident Commander is responsible for:

- G Providing a size-up of the fire to dispatch as soon as possible
- G Using guidance found in the fire Management Plan or in the Delegation of Authority, determine the strategy and tactics to be used.
- G Determine the resources needed for the fire.
- G Provide for firefighter safety.
- G Brief assigned resources on the strategy and tactics to be used, expected fire behavior, historic weather and fire behavior patterns, impacts of drought, live fuel moisture, escape routes and safety zones, and radio frequencies to be used
- G Advising dispatch of resource needs on the fire.
- G Managing all aspects of the incident until relieved or the fire is suppressed

Each engine will have a qualified Engine Boss (ENGB) or Engine Operator (ENOP) who will serve as the supervisor of the engine and crew. The ENGB or ENOP will be responsible for receiving assignments from the Incident Commander, selecting appropriate tactics, and supervising the crew in the completion of assignment(s). Most importantly, the ENGB or ENOP is responsible for insuring the safety of assigned crew members.

4. Escaped Fires/Extended Attack

The Incident Commander will notify the FMO whenever it appears a fire will escape initial attack efforts, escape Service lands, or when fire complexity will exceed the existing capabilities. The FMO will be responsible for coordinating extended attack actions including:

- Completion of WFSA (Wildland Fire Situation Analysis) for Refuge Manager

- Assignment or ordering of appropriate additional resources
- Completion of Delegation of Authority if needed
- Briefing the Project Leader of the situation

I. Mop up Standards and Emergency Stabilization and Rehabilitation

The IC will be responsible for mop-up and mitigation of suppression actions taken on Refuge fires. The mop-up standards established in the Fireline Handbook will be followed. Refuge fires will be patrolled or monitored until declared out.

Prior to releasing all firefighters from a wildland fire the following actions will be taken:

- G All trash will be removed.
- G Firelines will be refilled and waterbars added if needed.
- G Hazardous trees and snags cut and the stumps cut flush.
- G Disked firelines should be compacted as soon as possible to preserve the living root stock of natives grasses
- G Overturned sod resulting from plowing must be rolled back with a grader or by hand and compacted to preserve native grass root stock.

Other emergency stabilization and emergency rehabilitation measures may be taken in accordance with Chapter 5 of the Fire Management Handbook. Briefly:

- G **Emergency stabilization** is the use of appropriate emergency stabilization techniques in order to protect public safety and stabilize and prevent further degradation of cultural and natural resources in the perimeter of the burned area and downstream impact areas from erosion and invasion of undesirable species. The Incident Commander may initiate Emergency Stabilization actions before the fire is demobilized, as delegated by the Agency Administrator, but completing emergency stabilization activities may be completed after the fire is declared out.
- G **Rehabilitation** is the use of appropriate rehabilitation techniques to improve natural resources as stipulated in approved refuge management plans and the repair or replacement of minor facilities damaged by the fire. Total "rehabilitation" of a burned area is not within the scope of the Emergency Rehabilitation funding. Emergency Rehabilitation funding can be use to begin the rehabilitation process if other funding is committed to continue the rehabilitation throughout the life of the project (beyond the initial 3 years of Emergency Rehabilitation funding). Major facilities are repaired or replaced through supplemental appropriations of other funding.
- G Because of the emergency nature of the fire event, the emergency stabilization section of the Emergency Stabilization and Rehabilitation Plan (ESR Plan) must be developed expeditiously and is frequently developed by a local unit or designated burned area ESR team. The rehabilitation section of the ESR Plan is not considered an emergency, and is developed as other refuge land use plans. The refuge manager is

responsible for preparing all ESR Plans. In order to be funded, ESR Plans must meet resource management objectives and be approved by the Project Leader and the Regional Director.

J. Records and Reports

The FMO will complete all situation reports as soon as practical. The Incident Commander will complete the DI-1202 fire report within 3 days. The FMO will review all DI-1202's for completeness and accuracy, and input data into the FMIS database within 10 days from the fire being declared out.

The IC will further advise the FMO of all expenses incurred and/or items lost or destroyed on the fire so that appropriate measures can be taken to track and replace supplies and equipment as needed.

OF-288's will be used to report all fire time, including hazard and premium pay, charged against the suppression account.

IX. PRESCRIBED FIRE MANAGEMENT

Fire, whether caused by lightning or native Americans, was a major natural process in the Northern Great Plains prior to European settlement and resulting intensive fire suppression. The Complex has been intensively using management ignited prescribed fire as a management tool since the early 1980's. From 1985-1995, 32,690 acres have been prescribed burned on 88 burn units. The average prescribed burn size was 371 acres. The Complex uses prescribed fire as a tool in two management areas: resource management and hazard fuels reduction.

A. Resource Management Prescribed Fire

Resource management prescribed fire is used to renovate, restore, create, or maintain diverse native plant communities to restore and perpetuate indigenous wildlife. Goals and objectives of units within the Complex were listed in the **Environmental Assessments** covering "**Management of Upland Habitats**" completed in 1994 for the Des Lacs NWR Complex. Goals of the resource management prescribed fire program:

- G Restoration of native prairie community.
- G Reduction/control of exotic vegetation, primarily Kentucky bluegrass, smooth brome, quackgrass and leafy spurge.
- G Control of woody vegetation invasion of grasslands, primarily western snowberry and silverberry.
- G Assist other Complex habitat management programs, such as native grass reseeding, Dense Nesting Cover establishment and maintenance.
- G Maintenance of planted nesting cover for upland nesting birds.
- G Create/improve beach habitat for nesting piping plovers

Based on monitoring of prescribed burning at Lostwood NWR, it is necessary to apply multiple prescribed burns to an area over a 12-15 year period to achieve many of the above goals. This scenario requires up to 5 burns with 2-4 years of rest between burns. The timing of burns vary according to specific objectives desired. Burning is usually conducted in late April through mid-June and mid-July through October.

Program Objective: Treat approximately 10,000-12,000 acres per year (approximately 20 percent of upland habitats in Complex) in order to accomplish resource management goals on 10-15 land management units. At the current level of funding the prescribed fire program cannot come close to treating all units in need of fire management, and to adequately monitor results. This is primarily due to limited staffing.

B. Hazard Fuels Reduction Prescribed Fire

The Complex hazard fuel reduction program proposes to use prescribed fire within or near structural/wildland interface areas, wildfire sensitive resources, and specific WPA and refuge boundary areas to reduce the risk from wildfire damage. Other areas not within the above descriptions but with heavy fuel loadings also fall into this program. WPA and refuge boundary zone burn units are selected based on values at risk on

adjacent land, probability for wildfire escape from FWS land, and fuels. Fuels in hazard fuel sites typically contain many years of accumulated grass, shrub and tree litter and high densities of live shrubs. The large volume of litter and shrub component causes complex control problems during suppression actions, because of potential high rate of spread and flame lengths that prevent direct attack of a headfire. High litter loadings allow wildfires to carry even during the growing season. To the greatest extent possible, hazard fuel burns will only be used when they can compliment resource management objectives. Other methods are also used to reduce fuel loads, such as mechanical (mowing, haying or discing) or biological (grazing).

Goals of Hazard Fuel Reduction Prescribed Fire program include:

- G Maintain dead fuel loadings of less than 3 tons/acre in hazardous fuel zones.
- G Maintain woody shrub vegetative component to #25-50% canopy coverage density.
- G Prevent hazardous fuel accumulations from endangering life, property and wildlife resources.

Objectives of Hazard Fuel Reduction Prescribed Fire program are:

- G Reduce dead fuel loadings (litter) of 2-3 tons per acre by approximately 75% or better.
- G Reduce canopy coverage density of shrub vegetation component by 50%.
- G Treat approximately 2,000 acres per year.
- G Burn units once every 4-7 years depending on fuel accumulations and resource management considerations. The timing of burns vary according to specific objectives desired. Burning is usually conducted in late April through mid-June and mid-July through October.

C. Planning

The refuge manager of each Complex field station is responsible for supervising the development of resource management objectives for individual units in their NWR or WMD. The Complex biologist may provide assistance in selection of the appropriate management tool needed to meet objectives. Prescribed fire is just one of a combination of tools available. If needed, the Zone FMO or regional prescribed fire specialist will be consulted for assistance in accomplishing desired objectives. Prescribed burn plans are prepared that document objectives and the plan of action for achieving them. Elements of each burn plan will meet all training, personnel, equipment, and other requirements as specified in the FWS Fire Management Handbook (621 FW 3, Section 2.2). Prescribed fires will be planned to minimize the risk of escape and/or to mitigate necessary risks and provide an adequate contingency plan for suppressing the fire should an escape occur. Burn plans can be written by any qualified burn boss. Burn plans will be submitted for review to the FMO, Project Leader, and Zone FMO at least 60 days prior to the planned burn day. The Project Leader will have final signature approval following the review process previously listed. Prescribed burns that are of a complex nature will be forwarded on to the Regional Prescribed Fire Specialist from the Project Leader for final

review and approval. The Zone FMO is not required to review the plan in this instance.

Contingency Planning: Planning for escaped fires as a result of prescribed burning activities will require the following contingency plan elements to be adhered to, specific planning details will be addressed in individual burn plans:

- G Adequate fire management staffing and reporting processes must be in place.
- G Provide for additional initial attack resources during periods of increased risk.
- G Prescribed fires must be monitored and status documented until declared out.
- G The status of contingency resources needs to be monitored for availability, including rural fire districts. The burn will not be implemented unless specified contingency resources are committed.
- G Determination of risk and appropriate response levels will consider active prescribed burns as well as wildland fires.
- G Burn plans will require separate complexity analyses to be prepared to address changes in potential risks that occur seasonally as a result of fuel conditions and adjacent land use practices.
- G Initial actions (Appropriate Management Response) and resources required will be provided for, should holding actions fail, in order to prevent the declaration of a wildfire. Appropriate management response guidelines are listed in Table 1.
- G An escaped fire will be declared a wildfire in the event it requires additional resources or threatens to exceed one acre of private land.
- G In the event of a wildfire being declared, the District FMO and NDC should be promptly notified.
- G The contingency plan will identify who is to assume the role of Incident Commander.
- G Any residences or private property that are threatened will be notified and receive priority for protection.

Site Preparation: The FMO, refuge managers and fire management crew and other staff will be responsible for prescribed fire preparations including equipment maintenance and firebreak preparation. Prescribed burn units may require preparation including; mowed lines, disced lines and black lines. Public relations must be considered. Preparation for burns will be handled on an individual basis and will be identified in the prescribed burn plan for that unit. The FMO will prioritize the units to be burned on the Complex if conflicts exist.

Prescribed burns may be conducted at any time of the year, depending on objectives and prescription. The typical management ignited prescribed burn season for upland grassland units is April 1 through October 30. Timing of burns for individual units is based on specific objectives. Burning in wetlands to reduce emergent vegetation may also occur during the late fall or winter. The process of burning to establish blacklines which will be used as control lines for future burn units may also be conducted in fall and winter.

Each prescribed burn unit requires an open burning permit from the North Dakota Department of Environmental Health. Conditions and restrictions imposed on open

burning by the State of North Dakota are contained in Appendix F. The Lostwood Wilderness is established as a Class 1 Airshed. Current federal ambient air quality regulations have not impacted prescribed fire use within the wilderness as of this writing. Air quality monitoring on the refuge has not identified particulate matter, generated from past prescribed burns, exceeding the 24-hr and/or annual levels in or adjacent to the Wilderness unit. Monitoring has only identified infrequent off-site emissions of sulfur dioxide as exceeding standards. Nevertheless, management ignited prescribed burns require thorough smoke management planning, the utilization of appropriate atmospheric conditions for smoke dispersal, and coordination with the general public to mitigate potential smoke related problems from occurring.

When the North Dakota Rangeland Fire Danger Index is in the Very High or Extreme category, verbal permission must be obtained from the local rural fire protection district chief.

Multiple units may be burned at the same time within the Complex. The maximum number of simultaneous burns will depend on the availability of personnel, equipment and the cumulative impacts of smoke on sensitive targets. The FMO or other qualified Prescribed Fire Manager will be available to coordinate the management of simultaneous burns. It is not required that the Prescribed Fire Manager be on-site during the burns but he/she must be in contact with each burn project. Sufficient suppression forces must be available for each burn in the event of an escape.

The Complex has assisted private entities with limited prescribed burning to date. Lostwood NWR has assisted on 3 private burns, totaling approximately 400 acres. Several other requests have been previously turned down due to limited staff and agency guidelines. There is increased possibility to assist others in implementing prescribed burning in the area at this time. The Complex does not have enough staff to complete planned burns for both resource and hazard fuel reduction and therefore cannot undertake other burning projects. If a project is undertaken, it must be covered under a Wildlife Extension Agreement (WEA), funded with 1260 monies, which addresses prescribed fire specifically.

D. Training

The Complex will at minimum meet policy requirements of the Service prescribed fire qualification system. The Project Leader will be responsible for ensuring Complex personnel maintain qualifications necessary to implement the fire program. The FMO will maintain records and assist the Project Leader and Refuge managers with developing training plans for employees. The Complex will maintain a minimum of two staff members qualified at the prescribed burn boss two (RXB2) level. Additional training will be obtained for Complex resource managers in the area of fire effects and monitoring in prairie ecosystems in order to implement emerging Service ecosystem management strategies.

E. Complexity

Prescribed burns in the Complex vary from low to high complexity. Complexity is determined by such factors as fuels/fire behavior, objectives, resources at risk, ignition techniques, and potential for escape, as well as several other factors. The Prescribed Fire Complexity Rating System Guide is found in Appendix H. The majority of burns on the complex are rated as low complexity, with only a few rating out as moderate complexity. The complexity may be increased to high when aerial ignition and/or extensive personnel/equipment are required.

The average number of personnel required to conduct a burn on the Complex is 5-8. Most burns are structured with a burn boss (RXB3), often serving as ignition specialist (IGNS), two engine bosses (ENGB) or engine operators (ENOP) and 2-4 prescribed fire crew members (RXCM), using 2-4 light engines for holding. Wetliners are also often used with additional wildfire suppression resources also available.

F. Monitoring and Evaluation

Current monitoring and evaluation of prescribed burns is very limited due to funding and staffing limitations. Burn prescriptions and timing are based on past research and experience some of which is site specific to the Complex. Pre-burn evaluation is, at a minimum, limited to photo points or general photos, qualitative evaluation of fuel conditions, vegetation phenology and composition. In some units, cover density and frequency data have been scientifically collected on transects, and some point counts on nesting birds completed. Burn day evaluations document temperature, relative humidity, wind speed, fine fuel moisture, rate of spread, flame length, smoke dispersal, and general observations of fuel reduction. Post burn evaluation varies by unit and is limited by staff and funding. Density and frequency measurements may be made in selected units the following growing season, along with photo points or general photos, and qualitative estimates of vegetation response.

Service fire monitoring protocols will be adopted in full by the Complex when they are finalized and funding and staff are made available to complete the program. This would allow the Complex to quantitatively monitor changes to Service resources through full implementation of the fire program. If the resource management prescribed fire program proposed by this Fire Management Plan is fully funded, a more quantitative monitoring program will be implemented. The FTE increase proposed in this plan will be used to establish vegetation transects in each of the habitat types being prescribe-burned throughout the Complex. Wildlife surveys to measure response will also be conducted. Plant species composition and percent cover will be the primary information used to determine if burn objectives are being met and to monitor long term vegetation responses.

G. Prescribed Fire Impacts

Northern prairie grasslands evolved over the years with fire playing a major role in the perpetual maintenance

of the prairie ecosystem. Prescribed fire continues to be one of several management tools currently used to maintain and enhance the upland prairie grassland habitat of the Des Lacs NWR Complex. A combination of fire, grazing, haying, and rest promote a mosaic of native prairie

grasslands that will best meet the needs of mostly native, nesting waterfowl and other migratory birds. Without the use of fire these opportunities would not be possible as habitats would become less viable leading to a decline in native plant communities, and ultimately

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Environmental impacts of prescribed fire to visitors and users of the Complex are viewed as positive. Visitors to the Complex are drawn from all corners of the world to view the flora and fauna which flourish within these habitats. Visitors, whether birders, hunters, photographers or outdoor enthusiasts are increasingly spending greater amounts of time pursuing their interests and in doing so, generating a net positive economic and social impact the adjacent local economies. Negative impacts as a result of burning are limited to temporary closures of specific units during the implementation phase of burns for safety concerns. Smoke impacts, although minor can also be perceived as impaired viewing vistas or acceptance as a naturally occurring ecological processes. Both of these impacts are minor in scope, lasting only during the burning period. These impacts can be mitigated through increased education and public relation efforts, and utilizing of interpretive panels where appropriate.

Impacts to local communities are mostly positive when considering the environmental, social and economic aspects. Use of fire is seen as a habitat management tool for reducing hazardous levels of fuels that could significantly alter habitat and associate wildlife use which otherwise would yield an economic benefit to local businesses. Prescribed fire also minimized the risk of wildfire threats to adjacent communities and

landowners. The majority of neighbors accept the fact that the Service manages lands for waterfowl production, and most have a general appreciation for the value of wildlife. However, these neighbors expect the land to be managed for wildlife and not ignored. If complex lands are not actively managed, the habitat conditions will decline in quality and allow noxious weeds to increase, wildlife values to diminish, resulting in negative public opinion. If quality wildlife and habitat conditions are maintained through proper management, public opinion will remain positive and wildlife will continue to benefit both on and off Service managed lands. Negative sentiment exists when possible cooperators see potential grazing and haying opportunities burned. There tends to be a lack of understanding that habitat management requires a combination of fire, grazing, haying and rest. With time and efforts appropriately placed on education and public relations, prescribed fire should gain greater public acceptance.

When communities are not appropriately informed of planned activities, smoke from prescribed burns can create a negative social aspect as members of the community are concerned about potential health hazards, nuisance smoke, and wildfire. The likelihood of negative feeling are mitigated during the prescribed fire planning process as well as through notifications to landowners in the general vicinity of the burn and potential downwind residents. Specific mitigation efforts are discussed in further detail in this plan and in specific prescribed burn plans. See Section XIV for specific actions.

H. Reporting and Documentation

Individual prescribed burn plans are the primary document used to record prescribed fire information. Burn plans document objectives, methods, personnel, costs, fire behavior, weather, State air quality requirements, and monitoring and burn critique information. Each prescribed burn is also documented on an Individual Fire Report (DI-1202) form when a burn is completed and submitted to the FMO for Fire Management Information System (FMIS) database entry within 10 days of burn unit completion.

X. WILDLAND FIRE USE FOR RESOURCE BENEFIT

All wildfires will be suppressed using the appropriate management response concept.

Resource benefit will not be considered when determining the strategy and tactics to be used to suppress the fire.

Wildland fire to achieve resource management objectives will not be used for the following reasons:

- G Small size of Service land units increases probability of escape to private lands.
- G Fuel types promote rapid rates of spread and erratic fire behavior that may not be easily controlled.
- G "Natural" fuel loads generally not experienced in current times (e.g. Yellowstone 1988 fires).
- G Wildfires are generally limited to one burning period under normal conditions.
- G Conflicting land uses such as haying, grazing and farming on Service lands and adjacent private lands.

XI. AIR QUALITY / SMOKE MANAGEMENT GUIDELINES

Visibility and clean air are primary natural resource values. The protection of these resources is given full consideration in fire management planning and operations. In addition, smoke can have serious health and safety effects that must be considered during the planning and approval process.

Smoke emissions contain particulate matter, generated from prescribed fire, which can impair visibility and affect human health. The amount and nature of smoke produced depends upon the size of the burn, general moisture conditions at the time of the burn, and the characteristics of species burned (Ward and Hardy 1991). The higher the moisture content of the vegetation, the more smoke is produced. Most of smoke is carbon dioxide and water. Harmful chemicals from vegetative fires include carbon monoxide, particulate matter, acrolein, formaldehyde, and benzene, but these are produced in very small quantities (Prescribed Fire and Fire Effects Working Team 1985). Carbon dioxide is also produced but no more than what would occur in the normal vegetation decomposition process. Smoke effect can be mitigated by burning with suitable winds and unstable atmospheric conditions that loft and dissipate most ground level smoke (Prescribed Fire and Fire Effects Working Team 1985).

Because of the above considerations, management of smoke is incorporated into planning of prescribed fires, and to the extent possible, in suppression of wildfires. Sensitive areas are identified and precautions are taken to safeguard visitors and local neighbors. Smoke dispersal is a consideration in determining whether or not a prescribed burn is within prescription. Generally the fine grass fuels and small burn size (100-1000 acres) generate low volumes of smoke for short durations (4-6 hours).

Des Lacs NWR Complex fire management activities which result in the discharge of pollutants (smoke, carbon monoxide, particulates, and other pollutants from fires) are subject to and must comply with all applicable Federal, State, and local air pollution control requirements as specified by Section 118 of the Clean Air Act, as amended 1990. The North Dakota State Department of Health, Environmental Health Section implements the requirements of the Clean Air Act. Permits to open burn are required under the authority of the North Dakota Air Pollution Control Rules (Article 33-15, North Dakota Administrative Code). Written requests are submitted by the Complex to the Department of Environmental Health annually for each planned prescribed burn. Requests identify acres and general location of the burns. The State grants approvals in letter form and also notifies local and district Environmental Health Practitioners. Appendix F is a copy of the state of North Dakota Conditions/Restrictions Applicable to an Approval to Open Burn. Smoke complaints are also investigated by the State Department of Environmental Health. The State has periodically received complaints concerning smoke from Lostwood NWR prescribed fires or wildfires, but no other complaints from burning in the Complex. Complex personnel also take special care to notify neighbors, fire departments, and local law enforcement agencies on the day burns are conducted. These actions are specific requirements of individual burn plans.

Smoke from wildfires and prescribed fires is a recognized health concern for firefighters.

Prescribed burn bosses and wildfire incident commanders. Incident commanders must plan to minimize exposure to heavy smoke by incorporating the recommendations outlined in the publication Health Hazards of Smoke (Sharkey 1997). The use of respirators is not recommended since they are unable to restrict carbon monoxide intake, potentially a serious problem.

XII. FIRE RESEARCH AND MONITORING

Effects of fire on plant and animal populations need to be better understood. Through applied research and careful application of fire, data collected can provide managers with a better understanding of the natural ecological effects of fire, and the information needed to refine prescriptions to meet resource objectives.

Many studies of effects of prescribed burning or fire suppression have been conducted at Lostwood refuge during the past 15 years. Following are studies that are completed or will be completed during 1996:

Green, M. T. 1992. Adaptations of Baird's sparrows (*Ammodramus bairdii*) to grasslands: acoustic communication and nomadism. Ph.D. Dissertation, Univ. North Carolina, Chapel Hill. 102pp.

Kruse, A. D., and J. L. Piehl. 1986. The impact of prescribed burning on ground-nesting birds. Proc. North Am. Prairie Conf. 9:153-156.

Kruse, A. D., and B. Bowen. 1995. Effects of grazing and burning on nesting ducks in North Dakota. J. Wildl. Manage: In Press.

Madden, E. M. 1996. Habitat associations of migratory songbirds on northern mixed grass prairie. M.S. Thesis, Montana State Univ., Bozeman.

Manske, L. In Revision. Evaluation of prescribed burn treatments on Lostwood National Wildlife Refuge, 1990: interaction of range site, plant species composition, soil nitrogen, and mycorrhizal structure. Unpubl. report, Dep. Animal Range Sci., North Dakota State Univ., Fargo.

Murphy, R. K. 1993. History, nesting biology, and predation ecology of raptors in the Missouri Coteau of northwestern North Dakota. Ph.D. Dissertation, Montana State University, Bozeman. 212pp.

Murphy, R. K., and A. D. Kruse. In Prep. Changes in breeding bird abundance in response to spring burning and grazing of northern mixed grass prairie. (to be submitted for publication in *Prairie Nat.*, 1996)

Root, B. G. 1996. Vegetation dynamics and management of piping plover nesting beaches on saline lakes. Ph.D. Thesis, Univ. Missouri, Columbia.

Smith, K. A., R. K. Murphy, D. L. Michaelson, and W. C. Viehl. 1993. Habitat and predation management for nesting piping plovers at Lostwood National Wildlife Refuge, North Dakota. *Prairie Nat.* 25:139-147.

Smith, K. A., and R. K. Murphy. In revision. Response of plains sharp-tailed grouse to burning

of brush-invaded, mixed grass prairie. Wildl. Soc. Bull.

Smith, K. A. In Prep. Response of western snowberry and associated shrubs to multiple prescribed burns of a mixed grass prairie. (to be submitted for publication in Restor. Manage. Notes, 1996)

Winter, M. 1994. Habitat selection of Baird's sparrows in northern mixed-grass prairie. Diplomarbeit Thesis, Univ. Tübingen, Tübingen, Germany. 102pp.

The following fire research is urgently needed at Des Lacs National Wildlife Refuge Complex:

Relationships among prescribed burning, food resources, and population dynamics of breeding passerines endemic to northern mixed grass prairie.

Ecological monitoring of upland biotic communities at Des Lacs National Wildlife Refuge:

- 1) habitat associations of breeding birds: bird distribution and abundance under different prescribed burning scenarios (alternative models - adaptive resource management)
- 2) presence and distribution of other fauna and potential impacts of prescribed burning
- 3) long-term change in dominance and frequency of common flora in major upland plant communities associated with habitat management treatments
- 4) occurrence and dominance of noxious weeds especially leafy spurge
- 5) measure long-term change (since ca. 1900) in woody cover

Influence of quaking aspen on breeding waterfowl distribution at Lostwood National Wildlife Refuge (data in refuge files)

Integrated control of leafy spurge on wildlife refuges in northwestern North Dakota

Assessment of fire effects monitoring needs and preparation of fire effect monitoring plan.

Monitoring will comply with accepted scientific methods. This data, along with information gathered through research studies, will be used to improve the effectiveness of the fire management program, not only in the Complex but region- wide.

XIII. PUBLIC SAFETY

Firefighter and public safety (Life Safety) will always take precedence over property and resource protection during any fire management activity. Firefighter safety is covered in Section VIII. This section will deal with public safety.

The greatest threat to public safety from Complex wildfires are entrapment by extremely fast moving or a change of direction of fire fronts or fingers. Of particular concern are visitors or hunters who may be present in the area of the fire, or neighbors who initiate their own suppression actions without proper training, equipment, or communication. Complex staff will attempt to keep the fire scene clear of people except for Service firefighters, cooperating volunteer fire departments and any resources requested from cooperators. Fire resources, upon detection of general public encroaching upon a fire scene will notify the IC of the situation for resolution based on the actual situation. Law enforcement assistance may be requested if the situation so warrants. Road closures and airspace restrictions will be requested through the proper channels as the situation dictates. Prescribed burn units are generally closed to the public during burning operations, but they may be adjacent to public access roads such as county and township roads. In that case, roads may be temporarily posted closed to protect the public. Prior to ignition of any management ignited prescribed burn, the burn boss will make efforts to ensure that the unit is clear of visitors.

Smoke from a wildfire or prescribed burn could impair visibility on roads and become a hazard. During wildfires, the Incident Commander is responsible for managing traffic hazards from smoke, particularly smoke that drifts into a roadway causing dangerously reduced visibility. The fire dispatcher will notify the appropriate County Sheriff's office or North Dakota Highway Patrol whenever the Incident Commander believes that smoke may be causing a safety hazard. The Sheriff's Office can assess the situation and take action as needed. Smoke from prescribed fires is part of the burn prescription and is the responsibility of the burn boss. Actions to manage smoke include: use of road guards and pilot car, signing, altering ignition techniques and sequence, halting ignition, and suppressing the prescribed burn.

A final concern is for fires which might escape Service lands and spread to private property which may be inhabited. The following steps will be taken to minimize this threat:

- * The development of a professional and skilled fire management organization capable of safely suppressing wildfires and conducting prescribed fires.
- * The development of fire prevention programs.
- * The utilization of pre-suppression fire breaks.
- * The development of a hazard fuel management program.
- * Improving interagency coordination and cooperation including keeping local officials briefed on the potential for escape.

XIV. PUBLIC INFORMATION AND EDUCATION

Informing and educating the public is an important part of fire suppression, fire prevention, prescribed fire, and the Fish and Wildlife Service mission. Information and education is critical to gaining public support of prescribed fire program, fire suppression and fire prevention. Because of the importance of informing the public, the Lostwood Communication Council and the Des Lacs Advisory Council were both formed in the 1980's. Members were those from the local community interested in refuge management or in information-sharing and decision-making. Many meetings were held in the first years, with a broad exchange of ideas, philosophies, and explanations of refuge management. The Lostwood Communication Council disbanded in 1994 because issues of greatest concern had been resolved and no new problems had occurred. The Des Lacs Advisory Council still meets annually to keep up to date with current refuge management objectives.

Public information and education tasks in the fire program fall under three areas. These are:

A. Wildfire Suppression

The Incident Commander is in charge of disseminating fire information to the press and/or public on wildland fires. The Incident Commander may request assistance with these tasks if needed, and delegate the task to a public information officer if necessary.

B. Prescribed Fire

In order for the public to accept the prescribed fire program, they must be exposed to the results of prescribed burning on the land, and an explanation of the processes at work. Lostwood NWR presents a good graphic visual understanding of the effects of a fire regime on the northern Great Plains. Popular articles, newspaper stories, field days, and tours all are presented at varying times throughout the year to show the public the dramatic positive impacts that a fire regime has on the landscape. Other opportunities for public education awareness are also conducted throughout the year at Des Lacs NWR. Recently a fire prevention day was sponsored by the Kenmare Public School and Des Lacs personnel participated with a session on beneficial effects of prescribed fire on a recently burned site, and also demonstrated fire equipment. The local newspaper editor was also invited out to watch a prescribed burn in progress. The following general actions will be used to promote the prescribed fire program to the public:

- adhering to prescribed burn plan prescriptions
- press releases, and on-site stories by news media
- attendance at local volunteer fire department meetings
- inclusion of the prescribed fire message in interpretive materials and brochures
- personal contact with local citizens during or after prescribed burns

An education program aimed at grades 6-12 is currently being completed by the Complex. The goal is to better educate the youth of North and South Dakota and

Montana of the historical and current importance of fire in the ecology of northern Great Plains. A contractor was hired by the Service to develop "*An Educators Guide to Great Plains Fire Ecology*" and plans are for distribution and field testing in 1997 in area schools. The draft guide has been reviewed by many area educators, biologists, and interpretation specialists.

C. Fire Prevention

The Complex fire prevention plan is contained in section VIII - A.

XV. CULTURAL RESOURCES

All fire management activities will be in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended.

Cultural resources are scattered throughout the Complex as the area was heavily used by Native Americans, but is a relatively unresearched archeological area. The nearest site that has been excavated and studied is the Long Creek site near Estevan, Saskatchewan, about 40 miles northwest of Lostwood NWR (Wettlaufer and Mayer-Oakes 1960). That site revealed occupation of the area as long ago as 3043 \pm 125 B.C.; nine separate cultures were found. Because of the close proximity of Complex lands to the Long Creek site, some of the same cultures also may have occurred on Service lands. Historical records indicate that the last inhabitants of the area before white settlement were the southern Assiniboine tribes (Denig 1961) who now reside in Canada. Several hundred "tipi ring" sites are known to exist on Complex lands where Native Americans occupied the area either in permanent or transient camps.

Fires should have little impact on those resources known to exist within the Complex because few exist aboveground. One possible threat to these resources would be from the use of dozers, tractors with discs/plows, and other related fire equipment which creates a significant impact to the site. The use of such equipment within the Complex must be approved by the Refuge Manager on a fire by fire basis, and these resources will be considered in the approval process.

XVI. FIRE CRITIQUES AND PLAN REVIEW

The Fire Management Plan will be reviewed periodically to ensure the fire program advances and evolves with the FWS and the Complex's mission. It is the intention of the Complex to continue to make advances in fire management so that staff and resources and the public are afforded the best available protection. Accomplishment of this goal will require periodic review of the FMP and fire management operations as described below.

A. Wildfire Critiques

The Incident Commander will conduct a critique for each wildfire within 3 days of the fire being declared out, although the critiques of most fires will be short and informal. The FMO will conduct formal fire critiques if:

1. There was a significant fire related injury/accident.
(In conjunction with the Regional Fire Mgmt. Coordinator)
2. There was significant property or resource damage.
(In conjunction with the Regional Fire Mgmt. Coordinator)
3. Fire shelters were deployed (entrapment investigation also initiated).
4. There were significant safety concerns voiced.
5. There was an extended attack or fire exceeding 100 acres.

The results of formal fire critiques will be reported to the Zone FMO. The FMO may pass the results of critiques along to the Refuge Manager and/or Regional Fire Management Coordinator when appropriate.

B. Prescribed Fire Critique

Prescribed fires will be critiqued by the burn boss and documented in the prescribed burn plan in Section VIII. The FMO will conduct formal prescribed fire critiques if:

1. There was a significant fire related injury/accident.
(In conjunction with the Regional Fire Mgmt. Coordinator)
2. There was significant property or resource damage.
(In conjunction with the Regional Fire Mgmt. Coordinator)
3. The prescribed fire was declared a wildfire for any reason.
4. There were significant safety concerns voiced.
5. Significant smoke management problems occurred

C. Fire Season and Annual Plan Review

The Project Leader, FMO, and Refuge Managers will meet annually to review prevention, presuppression, suppression, and prescribed fire operations during the prior fire season, and develop strategies for improving these operations in the future. A listing

of recommended actions, staff members responsible for implementation, and implementation time frames will be developed.

XVII. CONSULTATION AND COORDINATION

All fire management program activities will be implemented in cooperation and coordination with the State of North Dakota, North Dakota Department of Environmental Health, and rural fire protection districts. Other agencies and organizations will be consulted with as needed.

This Fire Management Plan was developed following Service policy as outlined in the Fire Management Handbook. General program consultation and coordination will be sought from the Zone FMO, the Regional Fire Management Coordinator, Regional Prescribed Fire Specialist, and the National Interagency Fire Center (NIFC).

The following were consulted in the development of this plan:
Phil Street, Region 6 Fire Management Coordinator
John Segar, FMO Fort Niobrara NWR, Nebraska
Dan Dearborn, FMO Sheldon/Hart NWR, Oregon

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IXX. APPENDICES

Appendix A Des Lacs NWR Goals and Objectives

The goals and objectives developed for Des Lacs NWR are:

Goal: Provide safe and healthy habitat for native endangered species historically found in the area.

Goal: Provide life requirements for waterfowl and other migratory birds occurring in northwestern North Dakota.

Goal: Provide life requirements for resident wildlife species and promote diversity and abundance of flora and fauna within constraints of the primary purpose of the refuge.

Goal: Provide a wide range of opportunities for compatible wildlife/wildlands oriented interpretation, education, and recreation.

Goal: Preserve and enhance the environmental quality, wild character, and beauty of the refuge and surrounding areas.

Goal: Foster conditions where archaeological resources can exist in harmony with wildlife management.

Three of six above goals for refuge management focus heavily on upland habitats: 1) migratory bird maintenance and production, 2) preservation of natural diversity of flora and fauna, and 3) preservation of environmental quality. To achieve those goals the refuge has two key objectives that directly relate to upland habitats:

Objective: Restore and maintain about 12,000 acres of native grasslands in good to excellent ecological condition to provide seasonal life requirements of native birds.

Objective: Manage about 1860 acres of non-native grasslands as dense nesting cover (DNC) to provide high quality nesting habitat for waterfowl and other migratory birds.

Appendix B Lostwood NWR Goal and Objectives

The Mission Statement developed for Lostwood NWR is:

To restore and preserve the indigenous biological communities of the mid- to late 1800s on a representative sample of the physiographic region known as the Missouri Coteau of the Northern Great Plains' mixed grass prairie.

In keeping with the above purposes and Mission Statement, the following goals, in priority order,

and respective objectives, were developed in 1991 to direct management on Lostwood NWR:

_____Goal 1. Endangered species

To preserve, restore, and enhance indigenous flora and fauna that are endangered or imminently threatened with becoming endangered.

Objectives:

A. Maintain at least 9 breeding pairs of piping plovers (note: scientific names of fauna and flora mentioned in text are listed in Appendix) and increase, where possible, habitat for ≥ 16 additional breeding pairs, all with a hatching success of $\geq 50\%$ and fledgling success of ≥ 1.16 young per breeding pair (Ryan *et al.* 1993).

B. Provide protection and habitat for the following migrant endangered species: peregrine falcon, bald eagle, and whooping crane.

C. Maintain and increase breeding populations of unique northern Missouri Coteau species that are threatened through much of their range with habitat loss, such as Baird's sparrow, Sprague's pipit, marbled godwit, ferruginous hawk, mealy primrose, and Dakota skipper (Anonymous 1986; U.S. Fish and Wildlife Service 1992).

D. Consider reintroduction of greater sandhill crane, trumpeter swan, and western burrowing owl.

_____Goal 2. Other Wildlife

To develop and maintain diversity and abundance of fauna indigenous to the northern Missouri Coteau.

Objectives:

- A. Achieve over a 5-year period an average annual duck production of 14,000, striving for average annual breeding pair densities of 7500, pair-brood ratio of 0.32, and Mayfield hatching success $\geq 25\%$ (Cowardin 1979; Kruse and Bowen, in review).
- B. Achieve over a 5-year period an average annual production of ≥ 50 giant Canada geese (USFWS, unpubl. refuge files).
- C. Achieve over a 5-year period an average number of occupied nesting areas for ferruginous hawk of 3-10, for Swainson's hawk 10-25, for red-tailed hawk < 13 , and for great-horned owl < 10 (Murphy 1993).
- D. Achieve over a 5-year period average annual breeding densities (singing males/100 acres) for following passerines: Baird's sparrow ≥ 25 males, Sprague's pipit ≥ 12 males, grasshopper sparrow ≥ 25 males, savannah sparrow ≥ 8 males, western meadowlark ≥ 10 males, vesper sparrow ≥ 6 males, LeConte's sparrow ≥ 2 males, clay-colored sparrow ≥ 4 to ≥ 15 males, and common yellowthroat ≥ 1 to ≥ 5 (USFWS, unpubl. refuge files; M. Green, unpubl. data; A. Kruse and R. Murphy, unpubl. data).
- E. Achieve over a 5-year period average densities (pairs/100 acres) of ≥ 3 upland sandpiper, ≥ 1 each marbled godwit and willet (in areas with appropriate wetlands), and ≥ 2 Wilson's phalarope (in areas with appropriate adjacent wetlands) (USFWS, unpubl. refuge files; A. Kruse, unpubl. data).
- F. Achieve over a 5-year period an average spring sharp-tailed grouse population (males attending leks) of ≥ 600 males/year on the refuge (Smith and Murphy, in review).
- G. Maintain diversity of other indigenous wildlife species in balance with other goals and objectives of Lostwood Refuge.

Goal 3. Wildlands

To restore and maintain flora that occurred in the late 1800s (prior to homesteading by people of European descent).

Objectives:

- A. Manage for diverse, upland native flora e.g., mesic sites dominated by porcupine grass, big bluestem, tufted hairgrass, prairie dropseed, mat muhly, prairie cordgrass, blazing star, prairie lily, two-grooved milkvetch; moderate moisture sites with species such as green needlegrass, western wheatgrass, prairie sandreed, rough fescue, narrow-leaved poisonvetch, blanketflower, purple prairie clover; xeric sites with species such as blue grama, bluebunch wheatgrass, plains muhly, spike oat, Sandberg bluegrass, early blue grass, needle-and-thread, spotted gayfeather, purple coneflower, golden aster.
- B. Manage native woody plant composition to <25% canopy coverage western snowberry and snowberry/silverberry, and #300 clumps of aspen trees with an average size 0.5 acres/clump (Murphy 1993).
- C. Attempt to eradicate exotic species or at least reduce their frequencies of occurrence, e.g., quackgrass <10%, smooth brome <10%, Kentucky bluegrass <10%, leafy spurge <0.01%, and <0.1% by other exotic plants (e.g., sweet clover), with the combined total of exotics <20%.
- D. Manage indigenous wetland communities to maintain their biotic integrity.

_____Goal 4. Interpretation and Environmental Awareness

To promote an understanding and appreciation of area ecology to provide refuge visitors with high quality, safe, and enjoyable experiences compatible with wildlife and wildland objectives.

Objectives:

- A. To provide opportunities to the public to view, appreciate, and learn about unique birds and other wildlife of the northern Missouri Coteau.
- B. To provide opportunities for hunting of resident species in conjunction with State laws, and that is compatible with fall waterfowl sanctuary needs.
- C. To provide opportunities for the public to learn and appreciate the archeological histories of the Missouri Coteau.
- D. Develop areas that demonstrate management practices that can be used to enhance wildlife values on private lands.

_____Goal 5. Archeological Resources

Foster conditions under which archeological resources can exist in harmony with refuge

management.

Objectives:

- A. Evaluate cultural resources on public lands in terms of National Resource Criteria.
- B. Establish appropriate means for preserving sites eligible for the National Register.

_____Goal 6. Environmental Quality

Preserve and enhance the pristine quality, wild character, and beauty of a representative sample of the northern Missouri Coteau.

Objectives:

- A. Eliminate or reduce degradation of air, water, and soil resources.
- B. Maintain the integrity of the Lostwood Wilderness Area's integral vista and Class I air quality.

Appendix C Crosby/Lostwood WMD

The Mission Statement developed for Crosby-Lostwood WMD is as follows:

To maintain and improve habitat conditions to maximize waterfowl and other wildlife production and maintenance in Burke, Divide, Mountrail, and Williams and the "gooseneck" of Ward

Counties of northwestern North Dakota, including public and privately owned lands.

In keeping with the above purposes and Mission Statement, the following goals and objectives, in priority order, were developed in 1991 to direct management on Crosby-Lostwood WMD :

Goal 1. Endangered Species

Preserve, restore and enhance federally listed endangered and threatened species and the habitat upon which they depend.

Objective:

Provide safe and healthy habitat for native endangered species historically found in the area (whooping crane, piping plover, bald eagle, peregrine falcon, gray wolf).

Goal 2. Migratory Birds

Provide life requirements for waterfowl and other migratory birds occurring in northwestern North Dakota.

Objectives:

1. Achieve a five-year average annual production of 30,000 ducks and 1,000 giant Canada geese on Service-owned lands.
2. Maintain waterfowl nest success at 30% Mayfield on upland areas and 70% Mayfield or greater on more secure nesting areas such as, natural and artificial islands.
3. Maintain resting and staging areas for migrating waterfowl. Provide migrational habitat for an annual average of 100,000 ducks and 50,000 geese on Service-owned lands.
4. Promote use by a maximum number of migratory bird species by maintaining habitat diversity.

Goal 3. Other Wildlife

Provide life requirement for resident wildlife species and promote diversity and abundance of flora and fauna within the constraints of the primary purpose of the Wetland Management Districts.

Objective:

Maintain or increase the diversity and abundance of resident species at levels compatible with waterfowl management goals and objectives.

Goal 4. Public Use and Education

Provide a wide range of opportunities for compatible wildlife/wildlands-oriented interpretation, education and recreation.

Objectives:

1. Provide information for decision-making involving environmental values and resource use.
2. Provide and encourage outdoor recreation opportunities including hunting for deer, waterfowl and upland game oriented towards wildlife and wildlands.
3. Promote the concepts of outdoor ethics, sportsmanship, and the considerate use of Service recreational opportunities.

Goal 5. Cultural Resources

Foster conditions where archaeological resources can exist in harmony with wildlife management.

Objectives:

1. Evaluate cultural resources on public lands in terms of National Resource Criteria.
2. Establish appropriate methods for preserving sites eligible for the National Register.

Goal 6. Environmental Quality

Provide life requirements for resident wildlife species and promote diversity and abundance of flora and fauna within the constraints of the primary purpose of the Wetland Management District.

Objectives:

1. Eliminate or reduce degradation of air, water and soil resources.
2. Maintain and enhance unique and/or representative ecotypes, emphasizing the preservation of native prairie.

Five of the above six goals for District management are focused heavily toward managed upland habitats. To achieve those goals the WMDs have developed several objectives which relate to upland bird habitats as follows:

Preservation and management of upland habitats on Crosby-Lostwood WMDs is vital to achieve the purposes of the Districts. Uplands provide nesting cover for thousands of shorebirds, waterfowl, songbirds and raptors each year. Uplands also provide feeding habitat for many bird species at various life stages and times of the year. Good vegetative cover on uplands promotes the health and longevity of adjacent wetland habitat by filtering runoff and controlling erosion into wetland basins.

Appendix D Common/Scientific Names; Flora and Fauna

Common and scientific names of flora and fauna that occur on Des Lacs NWR Complex lands.

This list is not intended to be exhaustive.

Common Name/Scientific Name

FUNGI

mycorrhizal fungi	Phycomycetes
	Basidiomycetes

GRASSES AND SEDGES

smooth brome	Bromus inermis
Kentucky bluegrass	Poa pratensis
Canada bluegrass	Poa secunda
early bluegrass	Poa cusickii
needle and thread grass	Stipa comata
porcupine grass	Stipa spartea
green needlegrass	Stipa viridula
big bluestem	Andropogon gerardii
tufted hairgrass	Deschampsia caespitosa
prairie dropseed	Sporobolus herterolepis
prairie cordgrass	Spartina pectinata
Sandberg bluegrass	Poa sandbergii
early blue grass	Poa cusickii
switchgrass	Panicum virgatum
big bluestem	Andropogon gerardii
little bluestem	Schizachyrium scoparium
side-oats grama	Bouteloua curtipendula
tufted hairgrass	Deschampsia caespitosa
bluebunch wheatgrass	Agropyron spicatum
intermediate wheatgrass	Agropyron intermedium
tall wheatgrass	Agropyron elongatum
quack grass	Agropyron repens
western wheatgrass	Agropyron smithii
crested wheatgrass	Agropyron cristatum
prairie sandreed	Calamovilfa longifolia
rough fescue	Festuca scabrella
plains muhly	Muhlenbergia cuspidata
mat muhly	M. richardsonis
prairie junegrass	Koeleria gracilis
blue grama	Bouteloua gracilis
side-oats grama	Bouteloua curtipendula
Hooker's oatgrass	Helictotrichon hookeri
threadleaf sedge	Carex

FORBS

leafy spurge	Euphorbia esula
two-grooved milkvetch	Astragalus bisulcatus
narrow-leaf poisonvetch	Astragalus pectinatus
absinth wormwood	Artemisia absinthium
field bindweed	Convolvulus arvensis

Canada thistle
musk thistle
perennial sowthistle
blanketflower
purple prairie clover
mealy primrose
hoary cress
Russian knapweed
spotted knapweed
hemp
white sage
fringed sage
dwarf sagebrush
golden pea
prairie smoke
prairie crocus
nodding onion
yarrow
prairie wild rose
prairie lily
sweet clover
alfalfa
blazing star
spotted gay feather
pussytoes
smooth blue aster
fleabane
locoweed
cinquefoil
buttercup
ragwort
goatsbeard
meadow parsnip
yellow lady's slipper
purple coneflower
hairy golden aster

SHRUBS

Siberian pea
western snowberry
occidentalis
silverberry
western wild rose
serviceberry
choke cherry
ironwood
round-leavedhawthorn
red-osier dogwood
willow

Cirsium arvense
Carduus nutans
Sonchus arvensis
Gaillardia aristata
Dalea purpurea
Primula incana
Cardaria draba
Centaurea repens
Centaurea maculosam
Cannabis sativa
Artemesia ludoviciana
Artemesia frigida
Artemesia cana
Thermopsis rhombifolia
Geum triflorum
Anemone patens
Allium cernuum
Achillea lanulosa
Rosa arkansana
Lilium philadelphicum
Melilotus spp.
Medicago sativa
Liatris punctata
Liatris ligulistylis
Antennaria spp.
Aster laevis
Erigeron spp.
Oxytropis spp.
Potentilla spp.
Ranunculus spp.
Senecio spp.
Tragapogon dubius
Zizia aptera
Cypridium calceolus
Echinacea angustifolia
Chrysopsis villosa

Caragana arborescens
Symphoricarpos

Elaeagnus commutata
Rosa woodsii
Amelanchier alnifolia
Prunus virginiana
Ostrya virginiana
Crataegus chrysocarpa
Cornus stolonifera
Salix spp.

TREES

quaking aspen	<i>Populus tremuloides</i>
green ash	<i>Fraxinus pennsylvanica</i>
box elder	<i>Acer negundo</i>
cottonwood	<i>Populus deltoides</i>
American elm	<i>Ulmus americana</i>

INVERTEBRATES

Dakota skipper	<i>Hesperia dacotae</i>
tawny crescent butterfly	<i>Phyciodes batesii</i>
midges	Chironomidae
copepods	Copepoda
cladocerans	Cladocera
mollusks	Mollusca
amphipods	Amphipoda
rotifers	Rotifera
hemipterans	Hemiptera
dipterans	Diptera
brine shrimp	<i>Artemia</i> spp.
shore flies	<i>Ephydra</i> spp.
spiders	arachnida

REPTILES AND AMPHIBIANS

smooth green snake	<i>Opheodrys vernalis</i>
plains garter snake	<i>Thamnophis radix</i>
painted turtle	<i>Chrysemys picta</i>
tiger salamander	<i>Ambystoma tigrinum</i>
leopard frog	<i>Rana pipiens</i>
chorus frog	<i>Pseudacris nigrita</i>
wood frog	<i>Rana sylvatica</i>
Great Plains toad	<i>Bufo cognatus</i>

FISH

northern pike	<i>Esox lucius</i>
walleye	<i>Stizostedion vetreum</i>
black bullhead	<i>Ictalurus melas</i>
yellow perch	<i>Perca flavescens</i>
fathead minnow	<i>Pimephales promelas</i>
brook stickleback	<i>Culaea inconstans</i>
rainbow trout	<i>Salmo gairdneri</i>
white sucker	<i>Catostomus commersoni</i>

MAMMALS

white-tailed jackrabbit	<i>Lepus townsendi</i>
beaver	<i>Castor canadensis</i>
red fox	<i>Vulpes vulpes</i>
s. red-backed vole	<i>Clethrionomys gapperi</i>
muskrat	<i>Ondatra zibethicus</i>
western jumping mouse	<i>Zapus princeps</i>
meadow jumping mouse	<i>Zapus hudsonius</i>
northern pocket gopher	<i>Thomomys talpoides</i>
masked shrew	<i>Sorex cinereus</i>
pygmy shrew	<i>Microsorex hoyi</i>

n. short-tailed shrew	<i>Blarina brevicauda</i>
Franklin's gr. squirrel	<i>Spermophilus franklinii</i>
Richardson's gr. squirrel	<i>S. richardsonii</i>
13-lined ground squirrel	<i>S. tridecemlineatus</i>
deer mouse	<i>Peromyscus maniculatus</i>
meadow vole	<i>Microtus pennsylvanicus</i>
fox squirrel	<i>Sciurus niger</i>
raccoon	<i>Procyon lotor</i>
long-tailed weasel	<i>Mustela frenata</i>
least weasel	<i>Mustela nivalis</i>
woodchuck	<i>Marmota monax</i>
mink	<i>Mustela vison</i>
badger	<i>Taxidea taxus</i>
porcupine	<i>Erethizon dorsatum</i>
striped skunk	<i>Mephitis mephitis</i>
gray wolf	<i>Canis lupus</i>
coyote	<i>Canis latrans</i>
white-tailed deer	<i>Odocoileus virginianus</i>
mule deer	<i>Odocoileus hemionus</i>
elk	<i>Cervus elaphus</i>
pronghorn	<i>Antilocapra americana</i>
moose	<i>Alces alces</i>
bison	<i>Bison bison</i>

BIRDS

<i>Gavia immer</i>	Common loon
<i>Podilymbus podiceps</i>	Pied-billed grebe
<i>Podiceps auritus</i>	Horned grebe
<i>Podiceps grisegena</i>	Red-necked grebe
<i>Podiceps nigricollis</i>	Eared grebe
<i>Aechmophorus occidentalis</i>	Western grebe
<i>Pelecanus erythrorhynchos</i>	American white pelican
<i>Phalacrocorax auritus</i>	Double-crested cormorant
<i>Botaurus lentiginosus</i>	American bittern
<i>Ixobrychus exilis</i>	Least bittern
<i>Ardea herodias</i>	Great blue heron
<i>Casmerodius albus</i>	Great egret
<i>Egretta thula</i>	Snowy egret
<i>Egretta caerulea</i>	Little blue heron
<i>Bubulcus ibis</i>	Cattle egret
<i>Nycticorax nycticorax</i>	Black-crowned night-heron
<i>Plegadis chihi</i>	White-faced ibis
<i>Cygnus columbianus</i>	Tundra swan
<i>Anser albifrons</i>	Greater white-fronted goose
<i>Chen caerulescens</i>	Snow goose
<i>Chen rossii</i>	Ross' goose
<i>Branta canadensis</i>	Canada goose
<i>Aix sponsa</i>	Wood duck
<i>Anas crecca</i>	Green-winged teal
<i>Anas rubripes</i>	American black duck

<i>Anas platyrhynchos</i>	Mallard	<i>Recurvirostra americana</i>	American avocet
<i>Anas acuta</i>	Northern pintail	<i>Tringa melanoleuca</i>	Greater yellowlegs
<i>Anas discors</i>	Blue-winged teal	<i>Tringa flavipes</i>	Lesser yellowlegs
<i>Anas cyanoptera</i>	Cinnamon teal	<i>Tringa solitaria</i>	Solitary sandpiper
<i>Anas clypeata</i>	Northern shoveler	<i>Catoptrophorus</i>	
<i>Anas strepera</i>	Gadwall	<i>semipalmatus</i>	Willet
<i>Anas americana</i>	American wigeon	<i>Actitis macularia</i>	Spotted sandpiper
<i>Aythya valisineria</i>	Canvasback	<i>Bartramia longicauda</i>	Upland sandpiper
<i>Aythya americana</i>	Redhead	<i>Numenius phaeopus</i>	Whimbrel
<i>Aythya collaris</i>	Ring-necked duck	<i>Numenius americanus</i>	Long-billed curlew
<i>Aythya marila</i>	Greater scaup	<i>Limosa haemastica</i>	Hudsonian godwit
<i>Aythya affinis</i>	Lesser scaup	<i>Limosa fedoa</i>	Marbled godwit
<i>Melanitta fusca</i>	White-winged scoter	<i>Arenaria interpres</i>	Ruddy turnstone
<i>Bucephala clangula</i>	Common goldeneye	<i>Calidris alba</i>	Sanderling
<i>Bucephala albeola</i>	Bufflehead	<i>Calidris pusilla</i>	Semipalmated sandpiper
<i>Lophodytes cucullatus</i>	Hooded merganser	<i>Calidris mauri</i>	Western sandpiper
<i>Mergus merganser</i>	Common merganser	<i>Calidris minutilla</i>	Least sandpiper
<i>Mergus serrator</i>	Red-breasted merganser	<i>Calidris fuscicollis</i>	White-rumped sandpiper
<i>Oxyura jamaicensis</i>	Ruddy duck	<i>Calidris bairdii</i>	Baird's sandpiper
<i>Cathartes aura</i>	Turkey vulture	<i>Calidris melanotos</i>	Pectoral sandpiper
<i>Pandion haliaetus</i>	Osprey	<i>Calidris alpina</i>	Dunlin
<i>Haliaeetus leucocephalus</i>	Bald eagle	<i>Calidris himantopus</i>	Stilt sandpiper
<i>Circus cyaneus</i>	Northern harrier	<i>Limnodromus griseus</i>	Short-billed dowitcher
<i>Accipiter striatus</i>	Sharp-shinned hawk	<i>Limnodromus</i>	
<i>Accipiter cooperii</i>	Cooper's hawk	<i>scolopaceus</i>	Long-billed dowitcher
<i>Accipiter gentilis</i>	Northern goshawk	<i>Gallinago gallinago</i>	Common snipe
<i>Buteo platypterus</i>	Broad-winged hawk	<i>Phalaropus tricolor</i>	Wilson's phalarope
<i>Buteo swainsoni</i>	Swainson's hawk	<i>Phalaropus lobatus</i>	Red-necked phalarope
<i>Buteo jamaicensis</i>	Red-tailed hawk	<i>Larus pipixcan</i>	Franklin's gull
<i>Buteo regalis</i>	Ferruginous hawk	<i>Larus delawarensis</i>	Ring-billed gull
<i>Buteo lagopus</i>	Rough-legged hawk	<i>Larus californicus</i>	California gull
<i>Aquila chrysaetos</i>	Golden eagle	<i>Larus argentatus</i>	Herring gull
<i>Falco sparverius</i>	American kestrel	<i>Sterna hirundo</i>	Common tern
<i>Falco columbarius</i>	Merlin	<i>Sterna forsteri</i>	Forster's tern
<i>Falco peregrinus</i>	Peregrine falcon	<i>Chlidonias niger</i>	Black tern
<i>Falco rusticolus</i>	Gyr Falcon	<i>Columba livia</i>	Rock dove
<i>Falco mexicanus</i>	Prairie falcon	<i>Zenaidura macroura</i>	Mourning dove
<i>Perdix perdix</i>	Gray partridge	<i>Coccyzus</i>	
<i>Phasianus colchicus</i>	Ring-necked pheasant	<i>erythrophthalmus</i>	Black-billed cuckoo
<i>Tympanuchus cupido</i>	Greater prairie-chicken	<i>Coccyzus americanus</i>	Yellow-billed cuckoo
<i>Tympanuchus</i>		<i>Otus asio</i>	Eastern screech-owl
<i>phasianellus</i>	Sharp-tailed grouse	<i>Bubo virginianus</i>	Great horned owl
<i>Meleagris gallopavo</i>	Wild turkey	<i>Nyctea scandiaca</i>	Snowy owl
<i>Rallus limicola</i>	Virginia rail	<i>Athene cunicularia</i>	Burrowing owl
<i>Porzana carolina</i>	Sora	<i>Asio otus</i>	Long-eared owl
<i>Fulica americana</i>	American coot	<i>Asio flammeus</i>	Short-eared owl
<i>Grus canadensis</i>	Sandhill crane	<i>Aegolius acadicus</i>	Northern saw-whet owl
<i>Grus americana</i>	Whooping crane	<i>Chordeiles minor</i>	Common nighthawk
<i>Pluvialis squatarola</i>	Black-bellied plover	<i>Caprimulgus vociferus</i>	Whip-poor-will
<i>Pluvialis dominica</i>	Lesser golden-plover	<i>Chaetura pelagica</i>	Chimney swift
<i>Charadrius semipalmatus</i>	Semipalmated plover	<i>Archilochus colubris</i>	Ruby-throated hummingbird
<i>Charadrius melodus</i>	Piping plover		Belted kingfisher
<i>Charadrius vociferus</i>	Killdeer	<i>Ceryle alcyon</i>	
<i>Himantopus mexicanus</i>	Black-necked stilt	<i>Melanerpes</i>	

<i>erythrocephalus</i>	Red-headed woodpecker	<i>Lanius excubitor</i>	Northern shrike <i>Lanius</i>
<i>Sphyrapicus varius</i>	Yellow-bellied sapsucker	<i>ludovicianus</i>	Loggerhead shrike
<i>Picoides pubescens</i>	Downy woodpecker	<i>Sturnus vulgaris</i>	European starling
<i>Picoides villosus</i>	Hairy woodpecker	<i>Vireo solitarius</i>	Solitary vireo
<i>Colaptes auratus</i>	Northern flicker	<i>Vireo flavifrons</i>	Yellow-throated vireo
<i>Contopus borealis</i>	Olive-sided flycatcher	<i>Vireo gilvus</i>	Warbling vireo
<i>Contopus sordidulus</i>	Western wood-pewee	<i>Vireo philadelphicus</i>	Philadelphia vireo
<i>Contopus virens</i>	Eastern wood-pewee	<i>Vireo olivaceus</i>	Red-eyed vireo
<i>Empidonax flaviventris</i>	Yellow-bellied flycatcher	<i>Vermivora peregrina</i>	Tennessee warbler
<i>Empidonax alnorum</i>	Alder flycatcher	<i>Vermivora celata</i>	Orange-crowned warbler
<i>Empidonax traillii</i>	Willow flycatcher	<i>Vermivora ruficapilla</i>	Nashville warbler
<i>Empidonax minimus</i>	Least flycatcher	<i>Dendroica petechia</i>	Yellow warbler
<i>Sayornis phoebe</i>	Eastern phoebe	<i>Dendroica pensylvanica</i>	Chestnut-sided warbler
<i>Sayornis saya</i>	Say's phoebe	<i>Dendroica magnolia</i>	Magnolia warbler
<i>Myiarchus crinitus</i>	Great crested flycatcher	<i>Dendroica tigrina</i>	Cape May warbler
<i>Tyrannus verticalis</i>	Western kingbird	<i>Dendroica caerulescens</i>	Black-throated blue
<i>Tyrannus tyrannus</i>	Eastern kingbird	warbler	
<i>Eremophila alpestris</i>	Horned lark	<i>Dendroica coronata</i>	Yellow-rumped warbler
<i>Progne subis</i>	Purple martin	<i>Dendroica virens</i>	Black-throated green
<i>Tachycineta bicolor</i>	Tree swallow	warbler	
<i>Tachycineta thalassina</i>	Violet-green swallow	<i>Dendroica fusca</i>	Blackburnian warbler
<i>Stelgidopteryx</i>		<i>Dendroica palmarum</i>	Palm warbler
<i>serripennis</i>	N. rough-winged swallow	<i>Dendroica castanea</i>	Bay-breasted warbler
<i>Riparia riparia</i>	Bank swallow	<i>Dendroica striata</i>	Blackpoll warbler
<i>Hirundo pyrrhonota</i>	Cliff swallow	<i>Mniotilta varia</i>	Black-and-white warbler
<i>Hirundo rustica</i>	Barn swallow	<i>Setophaga ruticilla</i>	American redstart
<i>Cyanocitta cristata</i>	Blue jay	<i>Seiurus aurocapillus</i>	Ovenbird
<i>Pica pica</i>	Black-billed magpie	<i>Seiurus noveboracensis</i>	Northern waterthrush
<i>Corvus brachyrhynchos</i>	American crow	<i>Seiurus motacilla</i>	Louisiana waterthrush
<i>Corvus corax</i>	Common raven	<i>Oporornis agilis</i>	Connecticut warbler
<i>Parus atricapillus</i>	Black-capped chickadee	<i>Oporornis philadelphia</i>	Mourning warbler
<i>Sitta canadensis</i>	Red-breasted nuthatch	<i>Oporornis tolmiei</i>	MacGillivray's warbler
<i>Sitta carolinensis</i>	White-breasted nuthatch	<i>Geothlypis trichas</i>	Common yellowthroat
<i>Certhia americana</i>	Brown creeper	<i>Wilsonia pusilla</i>	Wilson's warbler
<i>Troglodytes aedon</i>	House wren	<i>Wilsonia canadensis</i>	Canada warbler
<i>Cistothorus platensis</i>	Sedge wren	<i>Icteria virens</i>	Yellow-breasted chat
<i>Cistothorus palustris</i>	Marsh wren	<i>Piranga olivacea</i>	Scarlet tanager
<i>Regulus satrapa</i>	Golden-crowned kinglet	<i>Piranga ludoviciana</i>	Western tanager
<i>Regulus calendula</i>	Ruby-crowned kinglet	<i>Pheucticus ludovicianus</i>	Rose-breasted grosbeak
<i>Sialia sialis</i>	Eastern bluebird	<i>Pheucticus</i>	
<i>Sialia currucoides</i>	Mountain bluebird	<i>melanocephalus</i>	Black-headed grosbeak
<i>Myadestes townsendi</i>	Townsend's solitaire	<i>Passerina amoena</i>	Lazuli bunting
<i>Catharus fuscescens</i>	Veery	<i>Passerina cyanea</i>	Indigo bunting
<i>Catharus minimus</i>	Gray-cheeked thrush	<i>Spiza americana</i>	Dickcissel
<i>Catharus ustulatus</i>	Swainson's thrush	<i>Pipilo erythrophthalmus</i>	Rufous-sided towhee
<i>Catharus guttatus</i>	Hermit thrush	<i>Spizella arborea</i>	American tree sparrow
<i>Turdus migratorius</i>	American robin	<i>Spizella passerina</i>	Chipping sparrow
<i>Dumetella carolinensis</i>	Gray catbird	<i>Spizella pallida</i>	Clay-colored sparrow
<i>Mimus polyglottos</i>	Northern mockingbird	<i>Spizella pusilla</i>	Field sparrow
<i>Oreoscoptes montanus</i>	Sage thrasher	<i>Poocetes gramineus</i>	Vesper sparrow
<i>Toxostoma rufum</i>	Brown thrasher	<i>Chondestes grammacus</i>	Lark sparrow
<i>Anthus spragueii</i>	Sprague's pipit	<i>Calamospiza</i>	
<i>Bombycilla garrulus</i>	Bohemian waxwing	<i>melanocorys</i>	Lark bunting
<i>Bombycilla cedrorum</i>	Cedar waxwing	<i>Passerculus</i>	

sandwichensis	Savannah sparrow	Agelaius phoeniceus	Red-winged blackbird
Ammodramus bairdii	Baird's sparrow	Sturnella neglecta	Western meadowlark
Ammodramus		Xanthocephalus	
savannarum	Grasshopper sparrow	xanthocephalus	Yellow-headed blackbird
Ammodramus leconteii	Le Conte's sparrow	Euphagus carolinus	Rusty blackbird
Ammodramus		Euphagus	
caudacutus	Sharp-tailed sparrow	cyanoccephalus	Brewer's blackbird
Passerella iliaca	Fox sparrow	Quiscalus quiscula	Common grackle
Melospiza melodia	Song sparrow	Molothrus ater	Brown-headed cowbird
Melospiza lincolnii	Lincoln's sparrow	Icterus spurius	Orchard oriole
Melospiza georgiana	Swamp sparrow	Icterus galbula	Northern oriole
Zonotrichia albicollis	White-throated sparrow	Pinicola enucleator	Pine grosbeak
Zonotrichia leucophrys	White-crowned sparrow	Carpodacus purpureus	Purple finch
Zonotrichia querula	Harris' sparrow	Loxia curvirostra	Red crossbill
Junco hyemalis	Dark-eyed junco	Loxia leucoptera	White-winged crossbill
Calcarius mccownii	McCown's longspur	Carduelis flammea	Common redpoll
Calcarius lapponicus	Lapland longspur	Carduelis pinus	Pine siskin
Calcarius pictus	Smith's longspur	Carduelis tristis	American goldfinch
Calcarius ornatus	Chestnut-collared	Coccothrauste	
longspur		vespertinus	Evening grosbeak
Plectrophenax nivalis	Snow bunting	Passer domesticus	House sparrow
Dolichonyx oryzivorus	Bobolink		
Appendix E	Des Lacs Complex Equipment List		

PRIMARY FIRE EQUIPMENT INVENTORY							
Description	Prop No	Funding	Date	Cost	Replace Cost	Maint Cost	Location
Type 6x engine Slip-in w/ foam	612637 612622	Fire	1991	22000	25000	660	LNWR
Type 4x engine, 1000 gal w/ foam	612544 612640	Fire	1988	67500	75000	2020	LNWR
Type 6x engine Slip-in w/ foam	612656	Fire	1991, 1994	22000	25000	660	LWMD
Type 6x engine Slip-in w/ foam	623692 612657	Fire	1991	18500	25000	550	CWMD
Type 6x engine Slip-in w/ foam	622324 622656	Fire	1994	16000	25000	480	DSLNR
Type 6x engine Slip-in	612597 612603	Fire	1990	27000	30000	810	DSLNR
Type 4X engine, 2000 gal w/ foam	622282	Fire	1994	110000	130000	3300	DSLNR
Type 4x engine, 1000 gal w/ foam	326759	Fire	1963	12500	75000	370	DSLNR
Type 3x Water Tender, 1000 gal	622325	Fire	1994	14000	20000	420	DSLNR
Wetliner, 300 gal high pressure sprayer	622710	O&M	1985	5700	6000	170	LNWR

Description	Prop No	Funding	Date	Cost	Replace Cost	Maint Cost	Location
Wetliner, 300 gal w/ foam	622318 622739	Fire	1994	10000	15000	300	LNWR
Pump, portable, Mini-mark		Fire	1994	900	1000	30	DSLNRW
Pump, portable, Mini-mark		Fire	1994	900	1000	30	LNWR
Pump, portable, Mini-mark	622379	Fire	1996	900	1000	30	CWMD
Pump, portable, Gorman Rupp	622739	Fire	1986	2100	2500	60	LNWR
Pump, portable, Flotopump	622417	Fire	1997	1300	1300	30	CWMD
Pump, portable, Flotopump	622418	Fire	1997	1300	1300	30	LNWR
Pump, portable, Flotopump	622370	Fire	1995	1300	1300	40	DSLNRW
Mower, rotary, JD	612629	O&M	1991	3100	5000	90	LNWR
Mower, rotary, JD	612621	O&M	1990	3000	5000	90	DSLNRW
Mower, rotary, JD	622359	O&M	1995	5000	5000	150	LWMD
Mower, rotary, JD	612630	O&M	1991	3100	5000	90	CWMD
Mower, rotary, Woods, Bat-wing	612724	O&M	1985	7500	10000	220	DSLNRW
Mower, sickle bar, JD	622350	Fire	1994	3900	4000	120	LNWR
Mower, sickle bar, JD	250565	O&M	1974	1000	4000	30	DSLNRW
Mower, disc, New Holland		Fire	1997	5100	5100	200	DSLNRW
Mower, DR Pro-ES	622386	Fire	1996	1400	1400	20	DSLNRW
Rake, firebreak, finger wheel, Tonutti		Fire	1997	2800	2800	70	DSLNRW
Rake, firebreak, finger wheel, Tonutti	612727	Fire	1994	2500	2500	70	LNWR
Rake, firebreak, finger wheel, Tonutti	622363	Fire	1995	2500	2500	70	DSLNRW
FTS RAWs weather station	612651	Fire	1994	12,000	13000	390	LNWR
Portable radios, BK EPH (3 high band)	622419 622420 622421	Fire	1997	1875	1875	60	DSLNRW
Portable radios, MT 1000 (5 low band)	Various	O&M	1992-94	3500	3800	100	DSLNRW
Portable radio, MT 1000 (1 high band)	652200	Fire	1994	800	800	20	DSLNRW
Portable radios, MT 500 (2 low band)	612554 612555	O&M	1988	1000	1500	30	LNWR
Portable radios, MT 1000 (2 low band)	612613 612614	O&M	1990	1500	1500	50	CWMD
Portable radios, MT 1000 (2 low band)	612704 612705	O&M	1992	1400	1500	40	LNWR
Portable radios, MT 1000 (1 low band)	612617	O&M	1990	650	750	20	LWMD

Description	Prop No	Funding	Date	Cost	Replace Cost	Maint Cost	Location
Mobile Radios, Fire engines (8 low band)	Various	O&M, Fire	1992-94	10500	12000	320	
Mobile Radios, Fire engines (8 high band)	Various	O&M, Fire	1990-95	10500	12000	320	
Base Station radio, low band	622258	O&M	1992	3800	4000	110	DSLNRW
Repeater and Duplexer, low band	612674 612689	O&M	1992	6000	7000	180	LNWR
Base Station radio, low band, RTI	612690	O&M	1992	9700	10000	290	CWMD
Chainsaw, Stihl 036		Fire	1997	380	380	20	DSLNRW
Chainsaw, Stihl 026		Fire	1995	450	450	20	DSLNRW
Chainsaw, Stihl, 026	622382	Fire	1996	275	285	20	LWMD
Chainsaw, Stihl, 026	622383	Fire	1996	275	285	20	CWMD
TOTAL					583825	13220	

SECONDARY FIRE EQUIPMENT INVENTORY							
Description	Prop No	Funding	Date	Cost	Replace Cost	Maint Cost	Location
Tractor, IHC	622543	O&M	1979	18700	50000	560	DSLNRW
Tractor, JD	612691	O&M	1992	47000	50000	1410	CWMD
Tractor, JD	612678	O&M	1992	47000	50000	1410	LWMD
Tractor, JD	622331	O&M	1994	43000	50000	1290	LNWR
Grader, road, CAT	248109	O&M	1972	22000	70000	660	DSLNRW
Grader, road, GALION	622295	O&M	1982	35000	70000	1050	LNWR
Disc, Taylor-way	622715	O&M	1985	7700	13000	230	DSLNRW
Trimmer, weed, gas	612684	O&M	1992	350	400	10	DSLNRW
Trimmer, weed, gas	612711	O&M	1992	350	400	10	LNWR
Chainsaw, Stihl, 026	612698	O&M	1992	300	400	20	DSLNRW
Chainsaw, Stihl, 025	612696	O&M	1992	250	350	20	LNWR
TOTAL					354550	6670	

Appendix F North Dakota Open Burning Regulations

Appendix G Pre-Attack Plan

Reserved

Appendix H Prescribed Fire Complexity Analysis

Prescribed Fire Complexity Worksheet

Using the attached criteria, rate each element on a scale of 1 to 10. The rating is then multiplied by the weighting factor (shown in parentheses in first column) to determine the weighted subvalues. The subvalues are then totaled to determine the weighted value which is used to determine the complexity of the prescribed burn.

MANAGEMENT IGNITED PRESCRIBED BURNS:

COMPLEXITY ELEMENT/ (WEIGHTING FACTOR)	RATING VALUE	WEIGHT SUBVALUE	LOW BURN COMPLEXITY	HIGH BURN COMPLEXITY
1. Potential for escape (10)		0	Very low probability.	High probability.
2. Values at risk (10)		0	Very little risk to people, property, resources.	Great risk to people, property, resources.
3. Fuels/fire behavior (5)		0	Mostly uniform and predictable.	Great variability & unpredictability. Prescription includes very low fuel moisture conditions.
4. Fire duration (5)		0	Fire generally of short duration & require little management.	Fires of long duration & require continuous management.
5. Smoke/air quality (7)		0	Smoke impacts are low or insignificant.	Smoke sensitive areas frequently affected.
6. Ignition methods (3)		0	Simple & rarely hazardous.	Highly technical or frequently hazardous.
7. Management team size (3)		0	Burn requires a few generalized positions.	Burn requires large team of separate, specialized positions.
8. Treatment objectives (7)		0	Objectives simple & easy to achieve. Prescriptions are broad & encompass safe burning conditions.	Objectives are difficult to achieve. Prescriptions are restrictive or burning conditions are risky.
Total Weighted Value:		0		

Low Complexity: 50 - 115 Total Weighted Value Points - Management Level: RXB3

Normal Structure: 116 - 280 Total Weighted Value Points - Management Level: RXB2

Complex Structure: 281 - 450 Total Weighted Value Points - Management Level: RXB1

Prepared by (RXBB/FMO)

February 1, 2007

Date

Appendix I Des Lacs Complex Fire Qualifications

Appendix J Fire Management Organization

Project Leader GS-485-13

Fire Management Officer GS-401-9/11

Range Technician (Career Seasonal) GS-455-5/6

Range Technician (Seasonal) GS-455-5

Range Technician (Seasonal) GS-455-3
Biologist GS-486-9/11

Admin Support Assistant GS-303-6

Office Auto Assistant GS-326-4

Refuge Operations Specialist GS-485-11
(Des Lacs NWR Refuge Manager)

Maintenance Worker WG-4749-8

Engine Equipment Operator WG-5716-10

Lostwood NWR Refuge Manager GS-485-9/11

Maintenance Worker WG-4749-9

Biological Technician GS-5

Crosby WMD ROS GS-485-9/11

Bio-Science Technician GS-404-7

Biological Technician GS-6

Lostwood WMD ROS GS-485-7/9

Appendix K

Fire Cooperators

Appendix L Cooperative Agreements

Bowbells VFD pg.1

bowbells pg.2

bowbells pg.3

Kenmare VFD pg.1

Kenmare pg.2

Kenmare pg.3

Powers lk pg.2

Powers lk pg.3

Stanley pg.2

Stanley pg.3

Exhibit 1

Des Lacs NWR, South ½

Exhibit 1A

Des Lacs NWR, North ½

Exhibit 2

Lostwood NWR

Exhibit 3

Crosby/Lostwood WMD

Exhibit 4

Lake Zahl NWR

Exhibit 5

Shell Lake NWR